

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY CERTIFICATE OF CONFORMITY WITH THE CLEAN AIR ACT 2017 MODEL YEAR

OFFICE OF TRANSPORTATION ANN ARBOR, MĬCHIGAN 48105 AND AIR OUALITY

	٠
Inc.	
Cummins	
\mathbf{To} :	
Issued	
Certificate	

(U.S. Manufacturer or Importer)

Certificate Number: HCEXL050.AAD-024

Expiration Date:

Effective Date: 11/15/2016

Issue Date: 11/15/2016

> Byron J. Bunker, Division Director Compliance Division

> > 12/31/2017

Revision Date:

₹ Z

Model Year: 2017

Manufacturer Type: Original Engine Manufacturer Engine Family: HCEXL050.AAD

Mobile/Stationary Indicator: Stationary

Emissions Power Category: 560<kW<=2237 Fuel Type: Diesel

After Treatment Devices: No After Treatment Devices Installed

Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in KED STA the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60

warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate may be revoked or suspended or It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a rendered void ab initio for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

The actual engine power may lie outside the limits of the Emissions Power Category shown above. See the certificate application for details.

Certification Summary Information Report Date: 11/15/2016 03:57:12 PM

CEX Manufacturer **Manufacturer Code** Cummins Inc.

HCEXL050.AAD Certificate Number HCEXL050.AAD-024 **Engine Family**

11/15/2016 **Certificate Issue Date** Certificate Effective Date 11/15/2016 **Model Year** 2017 CARB Executive Order # N/A

Certificate Revision 0 **Certificate Revision Date** N/A Number

Test Dataset numbers in this file:

General Information

Manufacturer Engine Family D283 CSI Type New Submission

Alternate Trade Names

Manufacturer Type Original Engine Manufacturer **Branding Arrangement**

List Of Engine Families Modified

Carry Over from a previous Carry Over Engine Family

Engine Family? FCEXL050.AAD Yes Name

Running Change(s)

Field Edits

Generator set?

Description

Application Federal Part 60 only certified to the requirements of

Mobile/Stationary Application Regulation Stationary part 89 Applicable Compliance

Tier 2 Standard Not Applicable Application Tier

Certification based on

Offset Engines None CARB Executive Order? No

Combining Engines from Multiple

Power Categories? Yes **Power Category** 560<kW<=2237

> If used for a Stationary Fire Pump, is rated speed > 2650? No

Limited Application **Emergency Stationary**

Yes

Limited Application Enforcement These engines are labeled per the requirements of 40CFR60.4202. The label states the engine operation is limited

to emergency operation

ABT and FEL Information

Includes Engines for Electrical

Participating in Averaging, Alternate Family Emission Banking, and Trading Program? No Limit Caps used? Yes

Not to Exceed (NTE) Compliance Information

Ambient Operation Region for

NTE Testing Not Temperature Limited

NTE Testing and Approach Description

This emergency stationary family is not subject to NTE requirements

Are you petitioning EPA to exclude operating points from NTE Testing because the engine is incapable of operation at those points? No

Description of how the engine is incapable of operation at the excluded operating points

Limit NTE Testing in a single defined region of speeds and

No

Are you requesting approval for

an NTE Deficiancy No

Engine Description

Engine Combustion Cycle 4 Stroke Compression Ignition

Fuel Options Single Fuel

Fuel #1

Fuel 300-500 ppm Low Sulfur Diesel Fuel (if other)

Fuel Metering System Direct Diesel Injection

Engine Family Comments

Page 1 of 58 CSI Submission/Revision Date: 2016-09-27 16:46:58.538

Date: 11/15/2016 03:57:12 PM Certification Summary Information Report

Engine Family HCEXL050.AAD Model Year 2017

Useful Life
Useful Life of the Engine Family 10 years / 8,000 hrs

Production Information

Total Projected Sales Federal Projected Sales

California Projected Sales

Production Start Date Production End Date

Manufacturing plant for these

Engines Seymour Engine Plant, Daventry Engine Plant

Agents For Service in US AvinasChander Manivannan

U.S. Port of Import Name City State

Manufacturer Comments about this Engine Family

September 27, 2016 This is a MY2017 carryover application for engine family (HCEXL050.AAD). Previously certified as GCEXL050.AAD. EPA

Date: 11/15/2016 03:57:12 PM Certification Summary Information Report

Engine Family HCEXL050.AAD Model Year 2017
Emission Control Systems

Non-After Treatment Devices

Are Non-ATDs used on this

Engine Family? Yes Non-ATD Types Electronic Control

Additional Comments about these Non-ATDs

After Treatment Devices

Are After Treatement Devices used on this Engine Family? No Assembly? No Assembly? No

Is the Cost of ATD components included in the cost of engine?

List of Components covered under Delegated Assembly exemption

Are Infrequent Adjustment Factors being used?

factors being used? --

Auxillary Emissions Control Devices

Are Auxillary Emissions Control Devices used on this Engine

Family? Yes

AECD Device #1

Will Activation of AECD
Please see separate AECD document reduces Effectiveness of

AECD Name for this information ECS? No

AECD Purpose

Please see separate AECD document for this information

AECD Sensed Parameters

Please see separate AECD document for this information

AECD Controlled Parameters

Please see separate AECD document for this information

Additional Comments about this AECD

--

Adjustable Parameters

Are Adjustable Parameters used

with this Engine Family? Yes

Adjustable Parameter #1

Adjustable Parameter Name Idle Speed

Adjustable Parameter Description

600-900 RPM adjustable using electronic service tool

Engine Family	HCEXL050.AAD	Model Year	2017	
Models and Parts				
Engine Model #1				
Engine Model	QSK19-C	Engine Code	2756:FR4463	
Displacement Per Cylinder (in		Total Displac		
liters)	3.16	liters)	18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	597	2100
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
2715	1500	2100	N/A	N/A
Intermediate Test Speed	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed
(RPM) 1400	5	5	447	(mm3/stroke) 395
		J	11 /	373
Method of Aspiration	Turbocharged	Aspiration De	ovice	
Number of Aspiration Devices	1	Aspiration De Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo	9		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per		Number of Ex	xhaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Inform	mation			
Sales Area	Both			
Production Start Date		Production E	nd Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964171	6		
Software Calibration 1	SC40360	1		
Software Calibration 1	SC40367	1		
Software Calibration 1	SC40368	1		
Software Calibration 1	SC40382	1		
Software Calibration 1	SC40429	1		
Software Calibration 1	SC40445	1		
Software Calibration 1	SC40452	1		
Software Calibration 1	SC40463	1		
Software Calibration 1	SC40486	1		
0.0.0111.1.1	CC40507	1		

Engine Model #2

Software Calibration 1

Software Calibration 1

SC40507

SC40551

Date: 11/15/2016 03:57:12 PM

Engine Family	HCEXL050.AAD	Model Year	2017	
Engine Model	QSK19-C	Engine Code	2756:FR4464	
Displacement Per Cylinder (in liters)	-	Total Displace liters)		
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	563	1800
Maximum Torque (N*m) S	(RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
2987	1500	1800	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
1350	5	5	447	428
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	1	Aspiration De Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo		i Series	
Charge Cooler Type	Both	marger		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of Exper cylinder	chaust Valves	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production E	nd Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		
Sensor	3865312	l		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors Software Calibration 1	4964171 SC40361	6		
Software Calibration 1 Software Calibration 1	SC40384	1		
Software Calibration 1	SC40416	1		
Software Calibration 1	SC40410 SC40491	1		
Software Calibration 1	SC40491 SC40492	1		
Software Calibration 1	SC40495	1		
Software Calibration 1	SC40511	1		
Software Calibration 1	SC40517	1		
Software Calibration 1	SC40528	1		
Engine Model #3				
Engine Model	QSK19-C	Engine Code	2756:FR4465	
Displacement Per Cylinder (in liters)	3.16	Total Displace	ement (in 18.942	
<i>'</i>		nicis)	10.772	
Engine Block Arrangement	Inline			

Number of Cylinders	HCEXL050.AAD	Model Year	2017	
•	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	567	2100
Maximum Torque (N*m) S	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	$\begin{array}{c} Torque\ at\ Maximum\ Speed \\ (N^*m) \end{array}$	Maximum Engine Power (Kw)
2578	1500	2100	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
1400	5	5	447	375
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	1	Aspiration De Configuration		
Furbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of Ex per cylinder	chaust Valves	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production E	nd Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964171	6		
Software Calibration 1	SC40362	1		
Software Calibration 1	SC40363	1		
Software Calibration 1	SC40364	1		
Software Calibration 1	SC40426	1		
Software Calibration 1	SC40430	1		
Software Calibration 1	SC40437	1		
Software Calibration 1	SC40450	1		
Software Calibration 1	SC40453	1		
Software Calibration 1	SC40555	1		
Software Calibration 1	SC40570	1		
Engine Model #4				
Engine Model	QSK19-C	Engine Code	3232:FR4515	
	3.16	Total Displace liters)	ement (in 18.942	
Displacement Per Cylinder (in iters)				

Engine Family	HCEXL050.AAD	Model Year	2017	
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	597	1900
_	Speed at Maximum Torque	Maximum Speed Test	Torque at Maximum Speed	Maximum Engine Power
1	(RPM)	(RPM)	(N*m)	(Kw)
3000	1700	1900	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
1400	5	5	448	431
Method of Aspiration	Turbocharged			
Number of Aspiration Device	s 1	Aspiration De Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo	_		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per		Number of Ex	khaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Info	rmation			
Sales Area	Both			
Production Start Date		Production E	nd Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2843401	1	C .	C
Sensor	2872279	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Pressure Sensor 1	3408602	1		Rated Speed (RPM)
Sensor	3865312	1		1800
Pressure Sensor 2	4076493	1		Maximum Engine Power
Electronic Control Module 1	4921797	1		(Kw)
Fuel Injectors	4964171	6		N/A Eval Pate at Pated Speed
Software Calibration 1	SC40465	1		Fuel Rate at Rated Speed (mm3/stroke)
Engine Model #5				517
Engine Model	QSK19-G	Engine Code	1485:FR4446	
Displacement Per Cylinder (in liters)	n 3.16	Total Displace liters)	ement (in 18.942	
Engine Block Arrangement	Inline	•		
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	669	
	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
3549	1800	1800	N/A	
Intermediate Test Speed	Lower Tolerance of	Upper Tolerance of	Fuel Rate at Maximum	
(RPM)	Maximum Power (%)	Maximum Power (%)	Torque (mm3/stroke)	
0	5	5	517	
Method of Aspiration	Turbocharged	Agnivation Do	vico.	
Number of Aspiration Device	s 1	Aspiration De Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
· ····································	Page 7 of 58 CSI Subm	ingian/Davisian Data: 0	24.0.00.07.40.40.50.520	

Page 7 of 58 CSI Submission/Revision Date: 2016-09-27 16:46:58.538

Date: 11/15/2016 03:57:12 PM

Date: 11/15/2016 03:57:12 PM	Certification S	Summary Information	Report	
Engine Family	HCEXL050.AAD	Model Year	2017	
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valves	
Production and Sales Info	rmation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837533	1		
Fuel Injection Pump	2870940	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		Rated Speed (RPM) 1800
Pressure Sensor 1	3408600	1		Maximum Engine Power
Sensor	3865312	1		(Kw)
Pressure Sensor 1	4076493	1		N/A
Sensor	4921684	1		Fuel Rate at Rated Speed
Electronic Control Module 1	4921797	1		(mm3/stroke)
Fuel Injectors	4964171	6		500
Software Calibration 1	SC40315			
Software Calibration 1	SC40313 SC40324	1 1		
Software Calibration 1	SC40327	1		
Software Calibration 1	SC40328	1		
Engine Model #6				
Engine Model	QSK19-G	Engine Code	1485:FR4451	
Displacement Per Cylinder (i liters)	n 3.16	Total Displac liters)	cement (in 18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	634	
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
3363	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	500	
Method of Aspiration	Turbocharged			
Number of Aspiration Device	es 1	Aspiration D Configuratio		
Turbocharger Type(s)	Non Waste Gate Turboo	=	501105	
Charge Cooler Type	Both	nui gei		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per	110	Number of E	xhaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Info	rmation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837533	1		
Fuel Injection Pump	2870940	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		Rated Speed (RPM) 1800
Pressure Sensor 1	3408600	1		Maximum Engine Power
Sensor	3865312	1		(Kw)
Pressure Sensor 1	4076493	1		N/A
Sensor	4921684	1		Fuel Rate at Rated Speed
Electronic Control Module 1	4921797	1		(mm3/stroke) 542
Fuel Injectors	4964171	6		342
Software Calibration 1	SC40325	1		
Software Calibration 1	SC40326	1		
Software Calibration 1	SC40327	1		
Software Calibration 1	SC40328	1		
Software Calibration 1	SC40516	1		
Engine Model #7				
Engine Model	QSK19-G4	Engine Code	3866:FR4581	
Displacement Per Cylinder (in liters)	3.16	Total Displac	cement (in 18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	669	
Maximum Torque (N*m) S ₁	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
3549	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	542	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	1	Aspiration D Configuratio	evice n Single	
Turbocharger Type(s)	Non Waste Gate Turboo	O .	n single	
Charge Cooler Type	Both	and a second		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	exhaust Valves	
Production and Sales Inform		F-1 of midel	_	
Sales Area	Both			
Production Start Date	Doui	Production F	End Date	
Fnaine Parts				
Engine Parts				

Date:	11	/15	/201	6	03.5	7.1	12	PI/	1
Date.	11	/13	/ 401	()	(1.))	/ .		IIV	

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881088	6		
Sensor	3085185	1		
Pressure Sensor 1	3408601	1		
Sensor	3865312	1		Rated Speed (RPM) 150
Fuel Injection Pump	4306517	1		Maximum Engine Powe
Electronic Control Module 1	4995444	1		(Kw)
Software Calibration 1	SC40587	1		N/A Fuel Rate at Rated Spee
Engine Model #8				(mm3/stroke)
Engine Model	QSK19-G4	Engine Code	4270:FR4580	638
visplacement Per Cylinder (in ters)	3.16	Total Displac	ement (in 18.942	
Engine Block Arrangement	Inline	11015)	1000.2	
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	634	
Maximum Torque (N*m) S		Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	I
4036	1500	1500	N/A	
Intermediate Test Speed	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum	
(RPM)	5	5	Torque (mm3/stroke) 638	
-		3	038	
Iethod of Aspiration	Turbocharged			
Tumber of Aspiration Devices	s 1	Aspiration De Configuration		
urbocharger Type(s)	Non Waste Gate Turboo	_	8	
Charge Cooler Type	Both			Part Usage End Date
ariable Valve Timing?	No			Ü
ariable Valve Lift?	No			
Number of Inlet Valves per ylinder	2	Number of E per cylinder	xhaust Valves	
roduction and Sales Infor	mation			
ales Area	Both			
Production Start Date	Both	Production E	nd Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	
Turbo Charger 1	2839018	1	Dange Sould Dute	
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881088	6		
Sensor	3085185	1		
Pressure Sensor 1	3408601	1		
Sensor	3865312	1		
Fuel Injection Pump	4306517	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC40586	1		
Engine Model #9				
Engine Model	QSK19-G5	Engine Code	3302:FR4516	
Displacement Per Cylinder (in	1	Total Displac	ement (in	

Engine Family	HCEXL050.AAD	Model Year	2017	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm) 159	Stroke (mm)	Rated Power (kW) 634	Rated Speed (RPM) 1500
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
4036	1500	1500	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	599	599
Method of Aspiration	Turbocharged			
Number of Aspiration Device	es 1	Aspiration D Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo	_	Ji Series	
Charge Cooler Type	Both	marger		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per	NO	Number of I	Exhaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Info	rmation			
Sales Area	Both			
Production Start Date		Production 1	End Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		Rated Speed (RPM)
Pressure Sensor 2	4076493	1		1800
Electronic Control Module 1	4921797	1		Maximum Engine Power
Fuel Injectors	4964171	6		(Kw)
Software Calibration 1	SC40472	1		N/A
Software Calibration 1	SC40473	1		Fuel Rate at Rated Speed
Software Calibration 1	SC40479	1		(mm3/stroke)
Engine Model #10	вечичи	1		541
Engine Model	QSK19-G5	Engine Code	e 3302:FR4517	
Displacement Per Cylinder (i		Total Displa		
liters)	3.16	liters)	18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	669	
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
3549	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	541	
Method of Aspiration	Turbocharged			
_	-	Aspiration D		
Number of Aspiration Device	es 1	Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo	charger	2016-09-27 16:46:58.538	

Date: 11/15/2016 03:57:12 PM

Date: 11/15/2016 03:57:12 PM			i Kepult	
Engine Family	HCEXL050.AAD	Model Year	2017	
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		Rated Speed (RPM) 1500
Pressure Sensor 2	4076493	1		Maximum Engine Power
Electronic Control Module 1	4921797	1		(Kw)
Fuel Injectors	4964171	6		N/A
Software Calibration 1	SC40473	1		Fuel Rate at Rated Speed
Software Calibration 1	SC40474	1		(mm3/stroke)
Software Calibration 1	SC40475	1		622
	50-10-175	1		
Engine Model #11	001/10 05	Engles Code	2202 FD 4524	
Engine Model	QSK19-G5	Engine Code		
Displacement Per Cylinder (in liters)	n 3.16	Total Displac	18.942	
Engine Block Arrangement	Inline	,		
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	701	
Maximum Torque (N*m)		Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
4463	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	622	
		5	022	
Method of Aspiration	Turbocharged	Aspiration D	Device	
Number of Aspiration Devices	s 1	Configuratio		
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Infor	emation			
Sales Area	Both			
Production Start Date	Doui	Production I	End Date	
Engine Parts				
Engine I at is				

Engine Forest-	HCEVI OFO A AD	Mr. 1.1 X7.	2017	
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2839020	1		
Sensor	2872277	1		
Fuel Injectors	2881083	6		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Sensor	3865312	1		Rated Speed (RPM) 1800
Pressure Sensor 2	4076493	1		Maximum Engine Power
Electronic Control Module 1	4921797	1		(Kw) N/A
Fuel Injectors	4964171	6		Fuel Rate at Rated Speed
Software Calibration 1	SC40472	1		(mm3/stroke)
Software Calibration 1	SC40473	1		601
Software Calibration 1	SC40489	1		
Engine Model #12				
Engine Model	QSK19-G8	Engine Code	3866:FR4582	
Displacement Per Cylinder (in		Total Displac		
liters)	3.16	liters)	18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	721	
Maximum Torque (N*m) S	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
3825	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	601	
Method of Aspiration	Turbocharged			
		Aspiration Do		Part Usage End Date
Number of Aspiration Devices		Configuration	n Single	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valves	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production E	nd Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	
Turbo Charger 1	2839020	1	<u>g</u>	
Sensor	2872277	1		
Sensor	2872279	1		
Fuel Injectors	2881088	6		
Sensor	3085185	1		
Pressure Sensor 1	3408601	1		
		-		
Sensor	3865312	I		
Sensor Fuel Injection Pump	3865312 4306517	1 1		
Sensor Fuel Injection Pump Electronic Control Module 1	3865312 4306517 4995444	1 1 1		

Engine Model #13

Engine Family	HCEXL050.AAD	Model Year		2017	
Engine Model	QSK19	Engine Code		3242:FR4511	
Displacement Per Cylinder (liters)	3.16	Total Displac liters)	cement (in	18.942	
Engine Block Arrangement	Inline				
Number of Cylinders	Bore (mm) 159	Stroke (mm) 159	Rated	Power (kW) 563	Rated Speed (RPM)
	Speed at Maximum Torque	Maximum Speed Test	Torque at	Maximum Speed	
	(RPM)	(\mathbf{RPM})		(N*m)	$(\mathbf{K}\mathbf{w})$
2987 Intermediate Test Speed	1500 Lower Tolerance of	1800 Upper Tolerance of	Fuel Det	N/A e at Maximum	N/A Fuel Rate at Rated Speed
(RPM)	Maximum Power (%)	Maximum Power (%)	Torque	(mm3/stroke)	(mm3/stroke)
1400	5	5		439.7	427.2
Method of Aspiration	Turbocharged	A			
Number of Aspiration Device	es 1	Aspiration D Configuratio		Series	
Turbocharger Type(s)	Non Waste Gate Turboo	9			
Charge Cooler Type	Both	-			
Variable Valve Timing?	No				
Variable Valve Lift?	No				
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valv	es 2	
Production and Sales Info	ormation				
Sales Area	Both				
Production Start Date		Production E	and Date		
Engine Parts					
Part Name	Part Number	Part Quantity	Part Us	age Start Date	Part Usage End Date
Turbo Charger 1	2838541	1			
Fuel Injectors	2867147	6			
Sensor	2872279	1			
Fuel Injection Pump	2888712	1			
Sensor	3085185	1			
Pressure Sensor 3	3408600	1			D . 10 10DD
Sensor	3865312	1			Rated Speed (RPM)
Pressure Sensor 2	4076493	1			2100 Maximum Engine Power
Electronic Control Module 1 Software Calibration 1	4995444 SC40536	1 1			(Kw)
Software Candiation 1	9C40330	1			N/A
Engine Model #14					Fuel Rate at Rated Speed
Engine Model	QSK19	Engine Code		3242:FR4549	(mm3/stroke)
Displacement Per Cylinder (liters)	in 3.16	Total Displac	cement (in	18.942	377.6
Engine Block Arrangement	Inline	•			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated	Power (kW)	
6	159	159		567	
	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)		Maximum Speed (N*m)	
2578	1500	2100		N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)		e at Maximum (mm3/stroke)	
1400	5	5		450	
Method of Aspiration	Turbocharged				
Number of Aspiration Device	es 1	Aspiration D Configuration		Series	
Turbocharger Type(s)	Non Waste Gate Turboo	e e		501100	
	Dogo 14 of 59 CCI Cuba				

Date: 11/15/2016 03:57:12 PM

Engine Family	HCEXL050.AAD	Model Year		2017	
Charge Cooler Type	Both				
Variable Valve Timing?	No				
Variable Valve Lift?	No				
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valvo	es 2	
Production and Sales Infor	mation				
Sales Area	Both				
Production Start Date		Production I	End Date		
Engine Parts					
Part Name	Part Number	Part Quantity	Part Us	age Start Date	Part Usage End Date
Turbo Charger 1	2838541	1			
Fuel Injectors	2867147	6			
Sensor	2872279	1			
Fuel Injection Pump	2888712	1			
Sensor	3085185	1			
Pressure Sensor 3	3408600	1			
Sensor	3865312	1			Rated Speed (RPM) 1900
Pressure Sensor 2	4076493	1			Maximum Engine Power
Electronic Control Module 1	4995444	1			(Kw)
Software Calibration 1	SC40533	1			N/A
Software Calibration 1	SC40535	1			Fuel Rate at Rated Speed
Software Calibration 1	SC40834	1			(mm3/stroke) 442.9
Engine Model #15					442.7
Engine Model	QSK19	Engine Code		3242:FR4551	
Displacement Per Cylinder (in liters)		Total Displac		18.942	
Engine Block Arrangement	Inline	11013)		10.5 .2	
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated	Power (kW)	
6	159	159		597	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)		Maximum Speed (N*m)	
3000	1700	1900		N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)		e at Maximum (mm3/stroke)	
1400	5	5	=	449.7	
Method of Aspiration	Turbocharged				
Number of Aspiration Devices	1	Aspiration D Configuration		Series	
Turbocharger Type(s)	Non Waste Gate Turboo	9			
Charge Cooler Type	Both				
Variable Valve Timing?	No				
Variable Valve Lift?	No				
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valve	es 2	
Production and Sales Inform	mation	- •			
Sales Area	Both				
Production Start Date	Dom	Production I	End Date		
Engine Parts					

Date:	11	/15	/201	6	03.5	7.1	12	PI/	1
Date.	11	/13	/ 401	()	(1.))	/ .		IIV	

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2838541	1		
Fuel Injectors	2867147	6		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		Rated Speed (RPM) 210
Pressure Sensor 2	4076493	1		Maximum Engine Powe
Electronic Control Module 1	4995444	1		(Kw)
Software Calibration 1	SC40524	1		N/A
Software Calibration 1	SC40532	1		Fuel Rate at Rated Spee
Engine Model #16				(mm3/stroke) 395.4
	OSV10	Engine Code	e 3716:FR4555	
Engine Model	QSK19	Engine Code		
Displacement Per Cylinder (inters)	3.16	Total Displa liters)	18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	597	
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
2715	1500	2100	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
1400	5	5	437.1	
Iethod of Aspiration	Turbocharged			
Number of Aspiration Devices	s 1	Aspiration I Configuration	Device Series	
Surbocharger Type(s)	Non Waste Gate Turboo	=		Part Usage End Date
Charge Cooler Type	Both	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		9
ariable Valve Timing?	No			
ariable Valve Lift?	No			
Sumber of Inlet Valves per	110	Number of I	Exhaust Valves	
ylinder	2	per cylinder		
Production and Sales Infor	rmation			
ales Area	Both			
Production Start Date		Production 1	End Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	
Turbo Charger 1	2843401	1	S	
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		
1 1035u10 DEHSUI Z	4306517	1		
Fuel Injection Dump		1		
Fuel Injection Pump		6		
Fuel Injectors	4964171	6		
•		6 1 1		

Engine Family	HCEXL050.AAD	Model Year	2017	
Engine Model	QSK19	Engine Code	3716:FR4707	
Displacement Per Cylinder (in liters)	•	Total Displac	cement (in 18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
6	159	159	563	1900
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
3163	1700	2100	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
1400	5	5	440	393.5
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	s 1	Aspiration D Configuratio		
Turbocharger Type(s)	Non Waste Gate Turboo	o o		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per	1.0	Number of F	xhaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Infor	rmation			
Sales Area	Both			
Production Start Date		Production E	End Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2843401	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		Rated Speed (RPM) 1900
Fuel Injection Pump	4306517	1		Maximum Engine Power
Fuel Injectors	4964171	6		(Kw)
Electronic Control Module 1	4995444	1		N/A
Software Calibration 1	SC40796	1		Fuel Rate at Rated Speed (mm3/stroke)
Engine Model #18				477.1
Engine Model	QSK19	Engine Code	3716:FR4708	
Displacement Per Cylinder (in liters)	n 3.16	Total Displac liters)	cement (in 18.942	
Engine Block Arrangement	Inline			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
6	159	159	620	
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
3460	1700	2100	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
1400	5	5	482	
Method of Aspiration	Turbocharged			
		Aspiration D	evice	
Number of Aspiration Devices	s 1	Configuration		

Page 17 of 58 CSI Submission/Revision Date: 2016-09-27 16:46:58.538

Date: 11/15/2016 03:57:12 PM

Engine Family	HCEXL050.AAD	Model Year	2017	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both	C		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per			Exhaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date	Dom	Production 1	End Date	
Engine Parts				
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2843401	1		
Sensor	2872279	1		
Fuel Injection Pump	2888712	1		
Sensor	3085185	1		
Pressure Sensor 3	3408600	1		
Sensor	3865312	1		
Pressure Sensor 2	4076493	1		Rated Speed (RPM) 1500
Fuel Injection Pump	4306517	1		Maximum Engine Power
Fuel Injectors	4964171	6		(Kw)
Electronic Control Module 1	4995444	1		N/A
Software Calibration 1	SC40797	1		Fuel Rate at Rated Speed
Engine Model #19				(mm3/stroke) 503
Engine Model	QSK38-G2	Engine Code	e 3268:FR6700	
Displacement Per Cylinder (ir		Total Displa		
liters)	3.16	liters)	37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1098	
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
6990	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	503	
Method of Aspiration	Turbocharged			
		Aspiration I		
Number of Aspiration Devices		Configuration	on Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of I per cylinder	Exhaust Valves	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production 1	End Date	
Encine Douts				
Engine Parts				
Í				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1	_	_
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 1	4049911	2		
Turbo Charger 2	4049911	2		Rated Speed (RPM) 150
Pressure Sensor 1	4076493	1		Maximum Engine Power
Sensor	4307466	1		(Kw)
Sensor	4910465	1		N/A
Electronic Control Module 1	4921797	1		Fuel Rate at Rated Speed
Fuel Injectors	4964172	12		(mm3/stroke)
Software Calibration 1	SC60533	1		442
Software Calibration 1	SC60534	1		
Engine Model #20				
Engine Model	QSK38-G2	Engine Code	3268:FR6701	
Displacement Per Cylinder (in iters)	3.16	Total Displac	cement (in 37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	970	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
6175	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	442	
Method of Aspiration	Turbocharged			
r		Aspiration D	evice	
Number of Aspiration Devices	2	Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves 2	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				

Page 19 of 58 CSI Submission/Revision Date: 2016-09-27 16:46:58.538

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 1	4049911	2		
Turbo Charger 2	4049911	2		Rated Speed (RPM) 180
Pressure Sensor 1	4076493	1		Maximum Engine Power
Sensor	4307466	1		(Kw)
Sensor	4910465	1		N/A
Electronic Control Module 1	4921797	1		Fuel Rate at Rated Speed
Fuel Injectors	4964172	12		(mm3/stroke) 486
Software Calibration 1	SC60535	1		400
Software Calibration 1	SC60536	1		
Engine Model #21				
Engine Model	QSK38-G	Engine Code	3267:FR6964	
Displacement Per Cylinder (in iters)	3.16	Total Displa liters)	cement (in 37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1280	
Maximum Torque (N*m) S	speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
6790	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	486	
Method of Aspiration	Turbocharged			
		Aspiration D	Device	
Number of Aspiration Devices		Configuration	on Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engino Dorte				
Engine Parts				
Engine Parts				

Page 20 of 58 CSI Submission/Revision Date: 2016-09-27 16:46:58.538

Date: 11/15/2016 03:57:12 PM	Ceruncation	Summary Information	1 Keport	
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4049908	1		
Turbo Charger 1	4049908	2		Rated Speed (RPM) 1500
Pressure Sensor 1	4076493	1		Maximum Engine Power
Sensor	4307466	1		(Kw)
Sensor	4910465	1		N/A
Electronic Control Module 1	4921797	1		Fuel Rate at Rated Speed
Fuel Injectors	4964172	12		(mm3/stroke) 552
Software Calibration 1	SC61025	1		332
Engine Model #22				
Engine Model	QSK38-G3	Engine Code		
Displacement Per Cylinder (in liters)	3.16	Total Displa liters)	cement (in 37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1224	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
7792	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	552	
Method of Aspiration	Turbocharged			
-	, and the second	Aspiration D	Device	
Number of Aspiration Devices	2	Configuration	on Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of F per cylinder	Exhaust Valves	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production 1	End Date	
Engine Parts				

Date: 11/15/2016 03:57:12 PM	Certification S	Summary Information	1 Report	
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4049902	2		
Turbo Charger 1	4049902	2		Rated Speed (RPM) 1500
Pressure Sensor 1	4076493	1		Maximum Engine Power
Sensor	4307466	1		(Kw)
Sensor	4910465	1		N/A
Electronic Control Module 1	4921797	1		Fuel Rate at Rated Speed
Fuel Injectors	4964172	12		(mm3/stroke) 430.3
Software Calibration 1	SC60530	1		430.3
Engine Model #23				
Engine Model	QSK38-G	Engine Code	3570:FR6786	
Displacement Per Cylinder (in liters)	3.16	Total Displa liters)	cement (in 37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	969	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
6169	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	430.3	
Method of Aspiration	Turbocharged			
-	, and the second	Aspiration D		
Number of Aspiration Devices	2	Configuration	on Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				

Date: 11/13/2010 05:57:12 PM		Summary Information		
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injectors	2867147	12		
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Fuel Injection Pump	2888748	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		Rated Speed (RPM) 150
Pressure Sensor 2	3408602	1		Maximum Engine Power
Sensor	3865312	1		(Kw)
Sensor	3865312	1		N/A Fuel Rate at Rated Speed
Turbo Charger 1	4049911	1		(mm3/stroke)
Turbo Charger 2	4049911	1		488.6
Pressure Sensor 1	4076493	1		100.0
Fuel Injection Pump	4306516	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60710	1		
Software Calibration 1	SC60711	1		
Engine Model #24				
Engine Model	QSK38-G	Engine Code	3570:FR6787	
Displacement Per Cylinder (in iters)	3.16	Total Displac liters)	cement (in 37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1096	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
6977	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	488.6	
Method of Aspiration	Turbocharged			
Namelan of Aminotian Danisas	2	Aspiration D		
Number of Aspiration Devices Furbocharger Type(s)		Configuration	n Paranei	
	Non Waste Gate Turboo	marger		
Charge Cooler Type Variable Valve Timing?	Both			
Variable Valve Lift?	No No			
	NO	Number of E	Exhaust Valves	
Number of Inlet Valves per cylinder	2	per cylinder	2	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				

Engine Family	HCEXL050.AAD	Model Year	2017	
				Dout Hoose Full Date
Part Name Fuel Injectors	Part Number 2867147	Part Quantity 12	Part Usage Start Date	Part Usage End Date
Sensor	2872279	12		
Fuel Injectors	2881088	12		
Fuel Injection Pump	2888748	1		
Fuel Injection Pump Sensor	2888749	1		
Pressure Sensor 2	3085185	1		Datad Creed (DDM)
Pressure Sensor 2 Pressure Sensor 2	3408600 3408602	1		Rated Speed (RPM)
Sensor	3865312	1		
		1		
Sensor Turbo Charger 2	3865312 4044551	1 2		
	4044331	2		
Turbo Charger 1 Pressure Sensor 1		1		
	4076493	1		
Fuel Injection Pump Electronic Control Module 1	4306516	1		
Electronic Control Module 1 Electronic Control Module 1	4921797 4995444	1		
		1		
Software Calibration 1	SC60714	1		
Engine Model #25				
Engine Model	QSK38-G	Engine Code	3571:FR6788	
Displacement Per Cylinder (in liters)	3.16	Total Displac liters)	ement (in 37.885	
Engine Block Arrangement	V-Shaped Engine	necrs,	37.003	
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1224	1500
Maximum Torque (N*m) Sp	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
7792	1500	1500	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	546.9	546.9
Method of Aspiration	Turbocharged			
		Aspiration Do	evice	
Number of Aspiration Devices	2	Configuration	n Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of Exper cylinder	xhaust Valves	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production E	nd Date	
Engine Parts				

Engine Femile	HCEVI 050 A A D	- 3.47 : 3 : 1 %7	2017	
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Pressure Sensor 2	3408602	1		
Sensor	3865312	1		
Sensor	3865312	1		Rated Speed (RPM) 1800
Turbo Charger 2	4049902	1		Maximum Engine Power
Turbo Charger 1	4049902	1		(Kw)
Pressure Sensor 1	4076493	1		N/A
Fuel Injection Pump	4306516	1		Fuel Rate at Rated Speed
Electronic Control Module 1	4995444	1		(mm3/stroke) 513.9
Software Calibration 1	SC60714	1		313.9
Engine Model #26				
Engine Model	QSK38-G	Engine Code	3572:FR6789	
Displacement Per Cylinder (in liters)	3.16	Total Displa liters)	cement (in 37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1376	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
7300	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	513.9	
Method of Aspiration	Turbocharged			
1.100.100 01 110p.110101	10100011111800	Aspiration D)evice	
Number of Aspiration Devices	2	Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				
6				

Page 25 of 58 CSI Submission/Revision Date: 2016-09-27 16:46:58.538

HCEXL050.AAD Part Number	Model Year	2017	
Part Number			
	Part Quantity	Part Usage Start Date	Part Usage End Date
2872279	1		
2881088	12		
3085185	1		
3408600	1		
3408602	1		
3774206	1		
3774206	1		Rated Speed (RPM) 180
3865312	1		Maximum Engine Powe
3865312	1		(Kw)
4076493	1		N/A
4306516	1		Fuel Rate at Rated Speed
4307466	1		(mm3/stroke)
4995444	1		486.4
SC60716	1		
OSK38-G	Engine Code	3573·FR6797	
QSICSO G	_		
3.16	liters)	37.885	
V-Shaped Engine			
Bore (mm)	Stroke (mm)	Rated Power (kW)	
159	159	1279	
eed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
1800	1800	N/A	
Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
5	5	486.4	
Turbocharged			
C	Aspiration D	evice	
2			
Non Waste Gate Turboo	harger		
Both			
No			
No			
2	Number of E per cylinder	Exhaust Valves	
ation			
Both			
	Production F	End Date	
	3408600 3408602 3774206 3774206 3865312 3865312 4076493 4306516 4307466 4995444 SC60716 QSK38-G 3.16 V-Shaped Engine Bore (mm) 159 20d at Maximum Torque (RPM) 1800 Lower Tolerance of Maximum Power (%) 5 Turbocharged 2 Non Waste Gate Turboc Both No No 2 ation	3408600	3408600

		_	Report	
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor	2872279	1		
Fuel Injectors	2881088	12		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Pressure Sensor 2	3408602	1		
Sensor	3865312	1		
Sensor	3865312	1		Rated Speed (RPM) 180
Turbo Charger 2	4049908	2		Maximum Engine Power
Turbo Charger 1	4049908	2		(Kw)
Pressure Sensor 1	4076493	1		N/A
Fuel Injection Pump	4306516	1		Fuel Rate at Rated Speed
Electronic Control Module 1	4995444	1		(mm3/stroke)
Software Calibration 1	SC60718	1		382
Engine Model #28				
Engine Model	QSK38-G4	Engine Code	3265:FR6697	
Displacement Per Cylinder (in iters)	3.16	Total Displac liters)	eement (in 37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1376	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
7300	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	382	
Method of Aspiration	Turbocharged			
_	-	Aspiration D		
Number of Aspiration Devices	2	Configuratio	n Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valves	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production E	and Date	

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1	_	_
Sensor	2872304	1		
Fuel Injection Pump	2888748	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Turbo Charger 2	3774206	2		Rated Speed (RPM)
Turbo Charger 1	3774206	2		
Sensor	3865312	1		
Turbo Charger 2	4049905	2		
Turbo Charger 1	4049905	2		
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	12		
Software Calibration 1	SC60527	1		
Software Calibration 1	SC60528	1		
Engine Model #29				
Engine Model	QSK38-G5	Engine Code	3267:FR6699	
Displacement Per Cylinder (in		Total Displac		
liters)	3.16	liters)	37.885	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
12	159	159	1280	1800
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
6790	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	486	486
Method of Aspiration	Turbocharged			
		Aspiration D		
Number of Aspiration Devices	2	Configuration	n Parallel	
Furbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valves	
Production and Sales Inform	mation			
Sales Area	Both			
Production Start Date		Production E	and Date	
Engine Parts				

		-	-	
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injection Pump	2870939	1		
Fuel Injection Pump	2888748	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4049908	2		
Turbo Charger 1	4049908	2		Rated Speed (RPM) 1200
Pressure Sensor 1	4076493	1		Maximum Engine Power
Sensor	4307466	1		(Kw)
Sensor	4910465	1		N/A
Electronic Control Module 1	4921797	1		Fuel Rate at Rated Speed
Fuel Injectors	4964172	12		(mm3/stroke)
Software Calibration 1	SC60531	1		480
Software Calibration 1	SC60532	1		
Engine Model #30				
Engine Model	QSK50-DR	Engine Code	2912:FR6622	
Displacement Per Cylinder (in		Total Displac	cement (in	
liters)	3.16	liters)	50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1104	
Maximum Torque (N*m) Sp	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
8785	1200	1200	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	480	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration D Configuratio		
Furbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valves	
Production and Sales Inforn	nation			
Sales Area	Both			
Production Start Date		Production E	End Date	

Turbo Charger 1 Sensor Fuel Injection Pump Fuel Injection Pump Fuel Injection Pump Sensor Pressure Sensor 1 Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters)	2837528 2872304 2888749 2888749 2888798 2888810 3085185 3408600 3865312 4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371 SC61258	Part Quantity 2 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1 1 1 1	Part Usage Start Date	Part Usage End Date Rated Speed (RPM)
Sensor Fuel Injection Pump Fuel Injection Pump Fuel Injection Pump Sensor Pressure Sensor 1 Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters)	2872304 2888749 2888798 2888810 3085185 3408600 3865312 4047336 4047336 4047493 4307466 4921797 4964172 4995444 SC60371	1 1 1 1 1 1 1 2 2 1 1 1 1 1 1 1 1 1 1 1		Rated Speed (RPM)
Fuel Injection Pump Fuel Injection Pump Fuel Injection Pump Sensor Pressure Sensor 1 Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters) Sensor Sensor Sensor Sensor Sensor Electronic Control Module 1 Fuel Injectors Selectronic Control Module 1 Software Calibration 1 Software Calibration 1	2888749 2888798 2888810 3085185 3408600 3865312 4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371	1 1 1 1 1 1 2 2 2 1 1 1 1 16 1		Rated Speed (RPM)
Fuel Injection Pump Fuel Injection Pump Sensor Pressure Sensor 1 Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters)	2888798 2888810 3085185 3408600 3865312 4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371	1 1 1 1 1 2 2 2 1 1 1 1 16 1		Rated Speed (RPM)
Fuel Injection Pump Sensor Pressure Sensor 1 Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters) 3.3	2888810 3085185 3408600 3865312 4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371	1 1 1 1 2 2 2 1 1 1 16 1		Rated Speed (RPM)
Sensor Pressure Sensor 1 Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters) 3.1	3085185 3408600 3865312 4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371	1 1 1 2 2 2 1 1 1 16 1		Rated Speed (RPM)
Pressure Sensor 1 Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters) 3.1	3408600 3865312 4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371	1 1 2 2 2 1 1 1 16 1		Rated Speed (RPM)
Sensor Turbo Charger 1 Turbo Charger 2 Sensor Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters) 3.1	3865312 4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371	1 2 2 1 1 1 16 1		Rated Speed (RPM)
Turbo Charger 1 Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters)	4047336 4047336 4076493 4307466 4921797 4964172 4995444 SC60371	2 2 1 1 1 16 1		
Turbo Charger 2 Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters)	4047336 4076493 4307466 4921797 4964172 4995444 SC60371	2 1 1 1 16 1		
Sensor Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model Displacement Per Cylinder (in liters) 3.1	4076493 4307466 4921797 4964172 4995444 SC60371	1 1 1 16 1		
Sensor Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters)	4307466 4921797 4964172 4995444 SC60371	1 1 16 1		
Electronic Control Module 1 Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters) 3.1	4921797 4964172 4995444 SC60371	1 16 1 1		
Fuel Injectors Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters) 3.1	4964172 4995444 SC60371	16 1 1		
Electronic Control Module 1 Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters) 3.1	4995444 SC60371	1 1		
Software Calibration 1 Software Calibration 1 Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters) 3.1	SC60371	1		
Software Calibration 1 Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters) 3.1				
Engine Model #31 Engine Model QS Displacement Per Cylinder (in liters) 3.1	SC61258	1		
Engine Model QS Displacement Per Cylinder (in liters) 3.1				
Displacement Per Cylinder (in liters) 3.1				
Displacement Per Cylinder (in liters) 3.1	SK50-G	Engine Code	2771:FR6621	
liters) 3.1		Total Displac		
Engine Block Arrangement V-	16	liters)	50.513	
	Shaped Engine			
Number of Cylinders I	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1559	1800
Maximum Torque (N*m) Speed at	Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Powe (Kw)
8270	1800	1800	N/A	N/A
	er Tolerance of num Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Spee (mm3/stroke)
0	5	5	447	447
Method of Aspiration Tu	ırbocharged			
		Aspiration De		
Number of Aspiration Devices 2		Configuration	n Parallel	
	on Waste Gate Turboch	narger		
0 1	oth			
Variable Valve Timing? No)			
Variable Valve Lift? No)			
Number of Inlet Valves per cylinder 2		Number of Exper cylinder	xhaust Valves	
Production and Sales Information				
Sales Area Bo	oth			
Production Start Date		Production E	nd Date	
Engine Parts				

Sensor 287328 2	Engine Family	HCEXL050.AAD	Model Year	2017	
Turbo Charger 287328	Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor 2872304 1 1 1 1 1 1 1 1 1	Turbo Charger 1	2837528	2		
Fuel Injection Pump	Sensor	2872279	1		
Fuel Injection Pump	Sensor	2872304	1		
Fuel Injection Pump	Fuel Injection Pump	2888749	1		
Sensor 3085185 1	Fuel Injection Pump	2888798	1		
Pressure Sensor 1 3408600 1	Fuel Injection Pump	2888810	1		
Sensor 3865312 1	Sensor	3085185	1		Rated Speed (RPM) 1800
Turbo Charger 2 4044551 2	Pressure Sensor 1	3408600	1		Maximum Engine Power
Turbo Charger 1	Sensor	3865312	1		
Pressure Sensor 2	Turbo Charger 2	4044551	2		
Sensor	Turbo Charger 1	4044551	2		_
Sensor	Pressure Sensor 2	4076493	1		
Fuel Injectors	Sensor	4307466	1		400
Software Calibration SC60386 1 SC603	Electronic Control Module 1	4921797	1		
Software Calibration SC60386 1 SC60465 1 SC604	Fuel Injectors	4964172	16		
Engine Model #32 Engine Model #32 Engine Model	Electronic Control Module 1	4995444	1		
Engine Model #32 Engine Model	Software Calibration 1	SC60386	1		
Engine Model QSK50-G Engine Code 2771:FR6667 Displacement Per Cylinder (in liters) 3.16 Engine Block Arrangement V-Shaped Engine Number of Cylinders Bore (mm) Stroke (mm) Rated Power (kW) 16 159 159 159 1396 Maximum Torque (N*m) Speed at Maximum Torque (RPM) (RPM) (RPM) (RPM) (RPM) N/A Intermediate Test Speed (RPM) (RPM) Maximum Power (%) Maximum Power (%) Torque (mm3/stroke) 0 5 5 406 Method of Aspiration Devices 2 Number of Aspiration Devices 2 Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Engine Code Total Total Displacement (in liters) 50.513 Sales Area Both	Software Calibration 1	SC60465	1		
Displacement Per Cylinder (in liters) 3.16 Engine Block Arrangement Number of Cylinders Bore (mm) 16 159 159 1396 Maximum Torque (N*m) 7406 Intermediate Test Speed (RPM) 0 5 Lower Tolerance of Maximum Power (%) 0 5 5 5 Method of Aspiration Devices Charge Cooler Type Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Production Start Date V-Shaped Engine Stroke (mm) Astroke (mm) Rated Power (kW) 1396 Rated Power (kW) Rated Power (kW) 1396 Rated Power (kW) 1396 Nemaximum Speed Test (RPM) Maximum Speed Test (RPM) Naximum Power (%) Maximum Power (%) Naximum Power (%) Naximum Power (%) Naximum Power (%) Naximum Power (%) Stroke (mm) Rated Power (kW) 1396 Torque at Maximum Speed (N*m) Naximum Power (N*m) Naximum Power (%) Naximum Power (%) Naximum Power (%) Spiration Device Configuration Parallel Production End Date	Engine Model #32				
Displacement Per Cylinder (in liters) 3.16 Engine Block Arrangement Number of Cylinders Bore (mm) 16 159 159 1396 Maximum Torque (N*m) 7406 Intermediate Test Speed (RPM) 0 5 Lower Tolerance of Maximum Power (%) 0 5 5 5 Method of Aspiration Devices Charge Cooler Type Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Production Start Date V-Shaped Engine Stroke (mm) Astroke (mm) Rated Power (kW) 1396 Rated Power (kW) Rated Power (kW) 1396 Rated Power (kW) 1396 Nemaximum Speed Test (RPM) Maximum Speed Test (RPM) Naximum Power (%) Maximum Power (%) Naximum Power (%) Naximum Power (%) Naximum Power (%) Naximum Power (%) Stroke (mm) Rated Power (kW) 1396 Torque at Maximum Speed (N*m) Naximum Power (N*m) Naximum Power (%) Naximum Power (%) Naximum Power (%) Spiration Device Configuration Parallel Production End Date	Engine Model	OSK50-G	Engine Code	2771:FR6667	
Number of Cylinders Bore (mm) Stroke (mm) Rated Power (kW)	Displacement Per Cylinder (in		Total Displa	cement (in	
Maximum Torque (N*m) Speed at Maximum Torque (RPM) Speed at Maximum Torque (RPM) Maximum Speed Test (RPM) N/A Intermediate Test Speed (RPM) N/A Intermediate Test Speed Maximum Power (%) Maximum Power (%) Fuel Rate at Maximum Maximum Power (%) Fuel Rate at Maximum Torque (mm3/stroke) 0 5 5 5 406 Method of Aspiration Turbocharged Number of Aspiration Devices 2 Aspiration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date			,		
Maximum Torque (N*m) Speed at Maximum Torque (RPM)	Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
RPM RPM					
Intermediate Test Speed (RPM)	Maximum Torque (N*m) S		Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
Maximum Power (%) Maximum Power (%) Torque (mm3/stroke)	7406	1800	1800	N/A	
Method of Aspiration Turbocharged Number of Aspiration Devices 2 Aspiration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Parallel Charge Cooler Type Both Parallel Variable Valve Timing? No No Number of Inlet Valves per cylinder Number of Exhaust Valves per cylinder 2 Production and Sales Information Both Production End Date			Upper Tolerance of Maximum Power (%)		
Number of Aspiration Devices 2 Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Aspiration Device Configuration Parallel Number of Exhaust Production End Date	0	5	5	406	
Number of Aspiration Devices 2 Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Parallel Configuration Parallel Configuration Parallel Parallel No Parallel Authorized Cooler Type Both Number of Exhaust Valves per cylinder 2 Production End Date	Method of Aspiration	Turbocharged			
Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Non Waste Gate Turbocharger Both Number of Exhaust Valves per cylinder 2 Production End Date	Number of Asniration Devices	2	Aspiration D	Device Parallel	
Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per Solinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	-		=	T didilor	
Variable Valve Timing? Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Number of Exhaust Valves per cylinder 2 Production End Date			margor		
Variable Valve Lift? Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Number of Exhaust Valves per cylinder 2 Production End Date	• ••				
Number of Inlet Valves per cylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	e e				
cylinder 2 per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date		110	Number of F	Exhaust Valves	
Sales Area Both Production Start Date Production End Date		2			
Production Start Date Production End Date	Production and Sales Infor	mation			
	Sales Area	Both			
Employa Doute	Production Start Date		Production I	End Date	
Engine rarts	Engine Parts				

Engine Family		Model Veer		
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		Rated Speed (RPM) 180
Pressure Sensor 1	3408600	1		Maximum Engine Powe
Sensor	3865312	1		(Kw) N/A
Turbo Charger 1	4044551	2		Fuel Rate at Rated Spee
Turbo Charger 2	4044551	2		(mm3/stroke)
Pressure Sensor 2	4076493	1		480
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60386	1		
Software Calibration 1	SC60463	1		
Software Calibration 1	SC60464	1		
Engine Model #33				
Engine Model	QSK50-G	Engine Code	2771:FR6692	
Displacement Per Cylinder (in liters)	3.16	Total Displac liters)	cement (in 50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1655	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
8780	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	480	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration D Configuratio	evice n Parallel	
Turbocharger Type(s)			n Faranei	
	Non Waste Gate Turboo	marger		
Charge Cooler Type	Both No			
Variable Valve Timing? Variable Valve Lift?				
	No	N	xhaust Valves	
Number of Inlet Valves per cylinder	2	per cylinder	2	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				

HCEXL050.AAD	Model Year	2017	
Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
2837528	2		C
2872279	1		
	1		
	1		
	1		
2888810	1		
	1		Rated Speed (RPM) 1800
3408600	1		Maximum Engine Power
3865312	1		(Kw)
	2		N/A
			Fuel Rate at Rated Speed
	1		(mm3/stroke)
	1		483
	1		
	-		
	_		
	_		
500501	1		
QSK50-G	Engine Code	3138:FR6641	
3 16			
	necis)	30.313	
	Studio (mm)	Dated Dawar (IvW)	
peed at Maximum Torque	Maximum Speed Test	Torque at Maximum Speed	I
Maximum Power (%)	Maximum Power (%)	Torque (mm3/stroke)	
5	5	483	
Turbocharged			
2	Aspiration D Configuratio	evice n Parallel	
	_		
No			
1,0		xhaust Valves	
2	ner cylinder		
2 mation	per cylinder	2	
mation	per cylinder	2	
mation	per cylinder Production E		
mation			
mation			
	2837528 2872279 2872304 2888749 2888798 2888810 3085185 3408600 3865312 4044551 4076493 4307466 4921797 4951941 4964172 4995444 SC60386 SC60561 QSK50-G 3.16 V-Shaped Engine Bore (mm) 159 peed at Maximum Torque (RPM) 1800 Lower Tolerance of Maximum Power (%) 5 Turbocharged 2 Non Waste Gate Turbock Both No	2837528	2837528 2 2872279 1 2872304 1 2888749 1 2888798 1 3085185 1 3408600 1 3865312 1 4044551 2 4076493 1 4307466 1 4921797 1 4951941 1 4964172 16 4995444 1 SC60386 1 SC60561 1 QSK50-G Engine Code 3138:FR6641 Total Displacement (in liters) 50.513 V-Shaped Engine Bore (mm) Stroke (mm) Rated Power (kW) 159 159 1655 peed at Maximum Torque (RPM) 1800 N/A Lower Tolerance of Maximum Speed Test (RPM) 1800 N/A Lower Tolerance of Maximum Power (%) Fuel Rate at Maximum Torque (MPM) 1800 N/A Lower Tolerance of Maximum Power (%) Fuel Rate at Maximum Torque (mm3/stroke) 5 5 5 483 Turbocharged Aspiration Device Configuration Parallel Non Waste Gate Turbocharger Both No

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		Rated Speed (RPM) 180
Pressure Sensor 1	3408600	1		Maximum Engine Powe
Turbo Charger 1	3774217	2		(Kw)
Turbo Charger 2	3774217	2		N/A
Sensor	3865312	1		Fuel Rate at Rated Spee
Turbo Charger 2	4043346	2		(mm3/stroke)
Turbo Charger 1	4043346	2		509
Pressure Sensor 2	4076493	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60403	1		
Software Calibration 1	SC60404	1		
	500000	1		
Engine Model #35				
Engine Model	QSK50-G	Engine Code	3139:FR6642	
Displacement Per Cylinder (in iters)	3.16	Total Displa liters)	cement (in 50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1749	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
9278	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	509	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration D Configuration		
Turbocharger Type(s)	Non Waste Gate Turboo			
Charge Cooler Type	Both	C		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of F per cylinder	Exhaust Valves	
· Production and Sales Infori	nation			
Sales Area Production Start Date	Both	Production 1	End Date	
Engine Parts				

Engine Family Part Name	HCEXL050.AAD Part Number	Model Year	2017	
_ **- * - ***		Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837527	2	Ture osuge source and	I will compe in it is a control
Turbo Charger 2	2837527	2		
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		Rated Speed (RPM) 180
Fuel Injection Pump	2888810	1		Maximum Engine Powe
Sensor	3085185	1		(Kw)
Pressure Sensor 1	3408600	1		N/A
Sensor	3865312	1		Fuel Rate at Rated Spee
Pressure Sensor 2	4076493	1		(mm3/stroke)
				480
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60406	1		
Software Calibration 1	SC60407	1		
Software Calibration 1	SC60408	1		
Engine Model #36				
Engine Model	QSK50-G	Engine Code	3140:FR6643	
Displacement Per Cylinder (in		Total Displac	cement (in	
liters)	3.16	liters)	50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1655	
Maximum Torque (N*m) Sp	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
8780	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	480	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration D Configuratio		
Turbocharger Type(s)	Non Waste Gate Turboo	harger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
		per cymiaer	2	
Production and Sales Inforn				
Sales Area	Both			
Production Start Date		Production E	End Date	
Engine Parts				

Engine Family	HCEXL050.AAD	Model Year	2017	
				Port Hooga End Data
Part Name	Part Number 2837528	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1 Turbo Charger 1	2837528	2 2		
· ·				
Turbo Charger 2	2837528	2		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		D . 10 10 10 10 10
Fuel Injection Pump	2888798	1		Rated Speed (RPM) 150
Fuel Injection Pump	2888810	1		Maximum Engine Powe
Sensor	3085185	1		(Kw) N/A
Pressure Sensor 1	3408600	1		Fuel Rate at Rated Speed
Sensor	3865312	1		(mm3/stroke)
Pressure Sensor 2	4076493	1		548
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60409	1		
Software Calibration 1	SC60410	1		
Engine Model #37				
Engine Model	QSK50-G	Engine Code	3140:FR6653	
Displacement Per Cylinder (in liters)	3.16	Total Displac	cement (in 50.513	
Engine Block Arrangement	V-Shaped Engine	,		
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1581	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
10000	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	548	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration D Configuratio		
Turbocharger Type(s)	Non Waste Gate Turboo	_	n raianci	
Charge Cooler Type	Both	marger		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per	110	Number of E	Exhaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Inform	nation			
Sales Area	Both			
		Production I	End Date	
Production Start Date		1 Toduction 1	21111 2 1110	

Part Name	Engine Family	HCEXL050.AAD	Model Year	2017	
Turbo Chunger 1	Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor	Turbo Charger 1	2837528	2		
Sensor 2872279 1 1 1 1 1 1 1 1 1	Turbo Charger 1	2837528	2		
Sensor	Turbo Charger 2	2837528	2		
Fuel Injection Pump	Sensor	2872279	1		
Fuel Injection Pump	Sensor	2872304	1		
Fuel Injection Pump 2888810	Fuel Injection Pump	2888749	1		
Sensor 3085185 1	Fuel Injection Pump	2888798	1		Rated Speed (RPM) 1800
Pressure Sensor 1 3408600 1 Fuel Rate at Rated Speec	Fuel Injection Pump	2888810	1		_
Sensor 3865312 1	Sensor	3085185	1		
Pressure Sensor 2	Pressure Sensor 1	3408600	1		
Sensor 4076493	Sensor	3865312	1		_
Sensor	Pressure Sensor 2	4076493	1		
Fuel Injectors	Sensor	4307466	1		400
Production Control Module	Electronic Control Module 1	4921797	1		
Software Calibration 1 SC60500 1	•	4964172	16		
Software Calibration 1		4995444	1		
Engine Model #38 Engine Model		SC60500	1		
Engine Model QSK50-G Engine Code 3227:FR6692 Displacement Per Cylinder (in liters) 3.16 Total Displacement (in liters) 50.513 Engine Block Arrangement V-Shaped Engine Number of Cylinders Bore (mm) Stroke (mm) Rated Power (kW) 16 159 159 1655 Maximum Torque (N*m) Speed at Maximum Torque (RPM) 1800 1800 N/A Intermediate Test Speed (RPM) 1800 1800 N/A Intermediate Test Speed Maximum Power (%) Maximum Power (%) Fuel Rate at Maximum (N*m) N/A Intermediate Test Speed (RPM) N/A Intermediate Test Speed Namimum Power (%) Maximum Power (%) N/A Intermediate Test Speed (N*m) N/A Intermediate Test Speed Namimum Power (%) N/A Intermediate Test Speed (RPM) N/A Intermediate Test Speed Namimum Power (%) N/A Intermediate Test Speed Namimum Namimum Speed (N*m) Intermediate Test Speed Namimum Namimum Speed Namimum Namimum Speed Namimum Nami	Software Calibration 1	SC60501	1		
Displacement Per Cylinder (in liters) 3.16 Engine Block Arrangement Number of Cylinders Bore (mm) 16 159 159 1655 Maximum Torque (N*m) 8780 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 1800 N/A Intermediate Test Speed (RPM) (RPM) 0 5 Maximum Power (%) Torque at Maximum Speed (N*m) Full Rate at Maximum Mower (%) Maximum Power (%) Number of Aspiration Devices Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Number of Inlet Valves per cylinder 2 Production and Sales Information Both Production Start Date Torque inm3/stroke Torque at Maximum Speed (N*m) Naximum Power (%) Full Rate at Maximum Torque (mm3/stroke) Forque (mm3/stroke) Forque (mm3/stroke) Forque (mm3/stroke) Forque (mm3/stroke) Full Rate at Maximum Torque (mm3/stroke) Forque (mm3/stroke)	Engine Model #38				
Engine Block Arrangement Number of Cylinders 16 159 159 159 159 1655 Maximum Torque (N*m) 8780 1800 1800 1800 N/A Intermediate Test Speed (RPM) 0 5 5 5 5 480 Method of Aspiration Furbocharger Type(s) Charge Cooler Type Variable Valve Lift? No Number of Inlet Valves per cylinder Cylinder Sales Area Production Start Date Sere (mm) Stroke (mm) Rated Power (kW) Rated Power (k) Rated Power (k	Engine Model	QSK50-G	Engine Code	3227:FR6692	
Number of Cylinders 16 159 159 159 1655 Maximum Torque (N*m) 8780 1800 1800 1800 N/A Intermediate Test Speed (RPM) (RPM) 0 5 Maximum Power (%) Maximum Power (%) Maximum Power (%) Turbocharged Maximum Power (%) Maximum Power (%) Speed at Maximum Speed Test (RPM) Upper Tolerance of Maximum Torque (mm3/stroke) 5 5 480 Method of Aspiration Turbocharged Number of Aspiration Devices 2 Aspiration Device Configuration Fuel Rate at Maximum Torque (mm3/stroke) Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date	Displacement Per Cylinder (in		Total Displac	cement (in	
Maximum Torque (N*m) Speed at Maximum Torque (RPM) Speed at Maximum Torque (RPM) Maximum Speed Test (RPM) (N*m) 8780 1800 1800 N/A Intermediate Test Speed Lower Tolerance of (RPM) Maximum Power (%) Maximum Power (%) Torque (mm3/stroke) 0 5 5 480 Method of Aspiration Turbocharged Number of Aspiration Devices 2 Aspiration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Number of Inlet Valves per cylinder 2 Number of Inlet Valves per cylinder 2 Number of Sales Area Both Production Start Date Production End Date	Engine Block Arrangement	V-Shaped Engine			
Maximum Torque (N*m) Speed at Maximum Torque (RPM) (RPM) (RPM) (N*m) 8780 1800 1800 N/A Intermediate Test Speed (RPM) Maximum Power (%) Maximum Power (%) Fuel Rate at Maximum Torque (mm3/stroke) 0 5 5 480 Method of Aspiration Devices 2 Aspiration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Maximum Speed Test (RPM) (N*m) N/A Fuel Rate at Maximum Torque (mm3/stroke) Fuel Rate at Maximum Power (%) 480 Fuel Rate at Maximum Power (%) 60 Fuel Rate at Maximum Power					
RPM RPM RPM (N*m)					
Intermediate Test Speed (RPM) Maximum Power (%) Maximum Power (%) Maximum Power (%) Torque (mm3/stroke) 0 5 5 480 Method of Aspiration Turbocharged Number of Aspiration Devices Turbocharger Type(s) Charge Cooler Type Both Variable Valve Timing? Variable Valve Lift? No Number of Inlet Valves per cylinder Cylinder Sales Area Both Production Start Date Lower Tolerance of Maximum Power (%) Fuel Rate at Maximum Torque (mm3/stroke) Aspiration Device Configuration Parallel Production End Date	Maximum Torque (N*iii) 5				
Method of Aspiration Turbocharged Number of Aspiration Devices Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder Cylinder Sales Area Both Production Start Date Sales Area Both Production End Date	8780	1800	1800	N/A	
Method of Aspiration Turbocharged Number of Aspiration Devices 2 Aspiration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Parallel Charge Cooler Type Both Parallel Variable Valve Timing? No Number of Exhaust Valves per cylinder Per cylinder Number of Inlet Valves per cylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Production End Date Production End Date			Upper Tolerance of Maximum Power (%)		
Number of Aspiration Devices 2 Configuration Device Configuration Device Configuration Device Configuration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date Aspiration Device Configuration Parallel Aspiration Device Configuration	0	5	5	480	
Number of Aspiration Devices 2 Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Parallel Charge Cooler Type Both Parallel Variable Valve Timing? No No Number of Inlet Valves per cylinder Number of Exhaust Valves per cylinder 2 Production and Sales Information Both Production End Date	Method of Aspiration	Turbocharged			
Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Non Waste Gate Turbocharger Both Number of Exhaust Valves per cylinder 2 Production End Date	Number of Aspiration Devices	2	Aspiration D Configuratio	evice n Parallel	
Variable Valve Timing? Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date No Number of Exhaust Valves per cylinder 2 Production End Date	=	Non Waste Gate Turboo	charger		
Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Number of Exhaust Valves per cylinder 2 Production End Date	Charge Cooler Type	Both			
Number of Inlet Valves per cylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	- · · · -	No			
cylinder 2 per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Variable Valve Lift?	No			
Sales Area Both Production Start Date Production End Date		2			
Production Start Date Production End Date					
Production Start Date Production End Date	Sales Area	Both			
Engine Parts			Production F	End Date	
	Eu ain a Danta				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		Rated Speed (RPM) 180
Sensor	3865312	1		Maximum Engine Power
Turbo Charger 1	4044551	2		(Kw)
Turbo Charger 2	4044551	2		N/A
Pressure Sensor 2	4076493	1		Fuel Rate at Rated Speed (mm3/stroke)
Sensor	4307466	1		(mm5/stroke) 480
Electronic Control Module 1	4921797	1		400
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60561	1		
Engine Model #39				
Engine Model	QSK50-G	Engine Code	3377:FR6730	
Displacement Per Cylinder (in		Total Displac		
liters)	3.16	liters)	50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1655	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
8780	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	480	
Method of Aspiration	Turbocharged			
•	C	Aspiration D	evice	
Number of Aspiration Devices	2	Configuratio	n Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves 2	
Production and Sales Inform	mation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Sensor	2872279	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		Rated Speed (RPM) 1500
Pressure Sensor 1	3408602	1		Maximum Engine Power
Turbo Charger 1	3774210	2		(Kw)
Turbo Charger 2	3774210	2		N/A
Sensor	3865312	1		Fuel Rate at Rated Speed
Turbo Charger 2	4044551	2		(mm3/stroke) 492
Turbo Charger 1	4044551	2		472
Electronic Control Module 1	4921797	1		
Sensor	4951491	1		
Fuel Injectors	4964172	16		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60616	1		
Engine Model #40				
Engine Model	QSK50-G	Engine Code	3621:FR60222	
Displacement Per Cylinder (in liters)	3.16	Total Displac	cement (in 50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1456	
Maximum Torque (N*m) S ₁	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
9399	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	492	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration D Configuratio	e vice n Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	U	n randici	
Charge Cooler Type	Both	841		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	exhaust Valves	
Production and Sales Inform		F	_	
Sales Area	Both			
Sales Area Production Start Date	Dom	Production F	End Date	
		2 2 June 2011 I	- 	
Engine Douts				
Engine Parts				

Date: 11/13/2010 05:57:12 PWI	Cer unication i	Summary miormanoi	i Keport	
Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injectors	2867147	16		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		
Pressure Sensor 1	3408600	1		
Pressure Sensor 2	3408602	1		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 2	4076493	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60799	1		
Software Calibration 1	SC61589	1		
Software Calibration 1	SC61705	1		
Engine Model #41				
Engine Model	QSK50-G	Engine Code	e 3621:FR60222	2G
Displacement Per Cylinder (in	•	Total Displa		
liters)	3.16	liters)	50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	Rated Speed (RPM)
16	159	159	1655	1800
Maximum Torque (N*m) S	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	474.2	474.2
Method of Aspiration	Turbocharged			
viculou of rispiration	Turboenarged	Aspiration I)evice	
Number of Aspiration Devices	2	Configuration	on Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per		Number of I	Exhaust Valves	
cylinder	2	per cylinder	2	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production 1	End Date	
Engine Parts				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injectors	2867147	16		
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888749	1		
Sensor	3085185	1		Rated Speed (RPM) 1800
Pressure Sensor 1	3408600	1		Maximum Engine Power
Pressure Sensor 2	3408602	1		(Kw)
Sensor	3865312	1		N/A
Turbo Charger 1	4044551	2		Fuel Rate at Rated Speed (mm3/stroke)
Turbo Charger 2	4044551	2		474.2
Pressure Sensor 2	4076493	1		7/4.2
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60799	1		
Software Calibration 1	SC61589	1		
Software Calibration 1	SC61705	1		
Engine Model #42				
Engine Model	QSK50-G	Engine Code	e 3621:FR60344	
Displacement Per Cylinder (in liters)	3.16	Total Displace	cement (in 50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1655	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
8780	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	474.2	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration D Configuration	Device On Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	· ·	1 4141141	
Charge Cooler Type	Both	6		
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Inform		1 .0		
Sales Area	Both			
Production Start Date	Doui	Production I	End Date	
Engine Parts				
-				

Part Number 2837528 2867147 2872304 2888749 2888798 288810 3085185 3408600 3865312 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	Part Quantity 2 16 1 1 1 1 1 2 2 1 1 1 1 1 1 1 1 1 1	Part Usa	ge Start Date	Rated Speed (RPM) 1800 Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke) 390.8
2867147 2872304 2888749 2888798 2888810 3085185 3408600 3865312 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	16 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1 1			Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
2872304 2888749 2888798 2888810 3085185 3408600 3865312 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	1 1 1 1 1 1 2 2 2 1 1 1 1			Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
2888749 2888798 2888810 3085185 3408600 3865312 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	1 1 1 1 1 1 2 2 2 1 1 1 1			Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
2888798 2888810 3085185 3408600 3865312 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	1 1 1 1 1 2 2 2 1 1 1 1			Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
2888810 3085185 3408600 3865312 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	1 1 1 1 2 2 2 1 1 1 1			Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
3085185 3408600 3865312 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	1 1 2 2 1 1 1 1			Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
3408600 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	1 1 2 2 1 1 1 1			Maximum Engine Power (Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 SC60796	2 2 1 1 1 1			(Kw) N/A Fuel Rate at Rated Speed (mm3/stroke)
4044551 4076493 4306515 4307466 4921797 4995444 SC60796	2 2 1 1 1 1			N/A Fuel Rate at Rated Speed (mm3/stroke)
4044551 4076493 4306515 4307466 4921797 4995444 SC60796	2 1 1 1 1			Fuel Rate at Rated Speed (mm3/stroke)
4076493 4306515 4307466 4921797 4995444 SC60796	1 1 1 1			(mm3/stroke)
4306515 4307466 4921797 4995444 SC60796	1 1 1 1			
4307466 4921797 4995444 SC60796	1 1 1			390.8
4921797 4995444 SC60796	1 1			
4995444 SC60796	1			
SC60796	1			
0061700	1			
SC01/02	1			
QSK50-G	Engine Code		3621:FR6832	
3.16	Total Displac liters)	cement (in	50.513	
V-Shaped Engine				
Bore (mm)	Stroke (mm)			
	Maximum Speed Test (RPM)	Torque at N	Maximum Speed N*m)	
1800	1800			
Lower Tolerance of laximum Power (%)	Upper Tolerance of Maximum Power (%)			
5	5	3	390.8	
Turbocharged				
2	Aspiration D Configuration	evice n	Parallel	
	_			
Both	C			
No				
No				
2		xhaust Valve	s 2	
tion	1			
Both				
	Production E	and Date		
L	QSK50-G 3.16 V-Shaped Engine Bore (mm) 159 I at Maximum Torque (RPM) 1800 ower Tolerance of aximum Power (%) 5 Turbocharged 2 Non Waste Gate Turboc Both No No 2	SC60796 SC61702 QSK50-G GSK50-G STotal Displace liters) Stroke (mm) Stroke	SC60796 SC61702 QSK50-G Engine Code Total Displacement (in liters) V-Shaped Engine Bore (mm) Stroke (mm) Rated In 159 I at Maximum Torque (RPM) (RPM) (RPM) (RPM) (RPM) (RPM) (RPM) (RPM) (Repul)	SC60796 1

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2	Ü	
Fuel Injectors	2867147	16		
Sensor	2872279	1		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		Rated Speed (RPM) 180
Sensor	3085185	1		Maximum Engine Powe
Pressure Sensor 1	3408600	1		(Kw)
Pressure Sensor 2	3408602	1		N/A
Turbo Charger 1	3774210	2		Fuel Rate at Rated Spee
Turbo Charger 2	3774210	2		(mm3/stroke)
Sensor	3865312	1		375.6
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 2	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60786	1		
	200700	-		
Engine Model #44				
Engine Model	QSK50-G	Engine Code		
Displacement Per Cylinder (ir liters)	3.16	Total Displa liters)	scement (in 50.513	
Engine Block Arrangement	V-Shaped Engine	,		
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1559	
Maximum Torque (N*m)	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
8270	1800	1800	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	375.6	
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	s 2	Aspiration I Configuration	Device on Parallel	
=			on Paranei	
Turbocharger Type(s)	Non Waste Gate Turboo	marger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No	NT 1 CT	7 1 4 37 1	
Number of Inlet Valves per cylinder	2	Number of I per cylinder	Exhaust Valves	
Production and Sales Infor	rmation			
Sales Area	Both			
Production Start Date		Production 1	End Date	
Engine Parts				

Part Number 2837528	Part Quantity	Part Usage Start Date	Part Usage End Date
2837528			
	2		
2867147	16		
2872279	1		
2872304	1		
2888749	1		
2888798	1		
2888810	1		Rated Speed (RPM) 180
3085185	1		Maximum Engine Powe
3408600	1		(Kw)
3408602	1		N/A
3774210	2		Fuel Rate at Rated Spee
3774210	2		(mm3/stroke)
	1		375.6
4044551	2		
4044551	2		
4076493	1		
4306515	1		
	1		
	1		
	1		
	1		
	1		
SC61626	1		
OSK50-G	Engine Code	3621:FR68	34
	Total Displac	cement (in	
	nters)	50.515	
	Charles (mass)	Dated Dames (LW)	
eed at Maximum Torque	Maximum Speed Test	Torque at Maximum Spe	ed
	` '	` /	
Lower Tolerance of	Upper Tolerance of	Fuel Rate at Maximum	ı
5	5	375.6	
Turbocharged	Achirotion D	lovico	
2			
Non Waste Gate Turboo	charger		
Both			
No			
No			
2		exhaust Valves	
ation	- *		
Dom	Production F	End Date	
	1 Toducion 1	Duv	
I	2888749 2888798 2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60788 SC61626 QSK50-G 3.16 V-Shaped Engine Bore (mm) 159 eed at Maximum Torque (RPM) 1800 Lower Tolerance of Maximum Power (%) 5 Turbocharged 2 Non Waste Gate Turboc Both No No	2888749	2888749 1 2888798 1 2888798 1 2888810 1 3085185 1 3408600 1 3408602 1 3774210 2 3774210 2 3865312 1 4044551 2 4044551 2 4044551 4076493 1 4307466 1 4921797 1 4995444 1 4995444 1 4995444 1 4995444 1 4995444 1 476626 1 4

Part Number 2837528 2867147 2872279 2872304 2888749 2888798 2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789 QSK50-G 3.16	Part Quantity 2 16 1 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1 1	cement (in	Rated Speed (RPM) 180 Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke) 491.3
2867147 2872279 2872304 2888749 2888798 2888810 3085185 3408600 3408602 3774210 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	16 1 1 1 1 1 1 1 1 1 2 2 2 1 1 2 1 1 1 1	e 3621:FR6839 cement (in	Rated Speed (RPM) 180 Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
2872279 2872304 2888749 2888798 2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1 1	cement (in	Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
2872304 2888749 2888798 2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 1 1 1 1 1 2 2 1 1 2 1 1 1 1 1 1 1	cement (in	Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
2888749 2888798 2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789 QSK50-G	1 1 1 1 1 1 1 2 2 2 1 1 2 1 1 1 1 1 1 1	cement (in	Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
2888798 2888810 3085185 3408600 3408602 3774210 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 1 1 2 2 2 1 2 1 1 1 1 1 1 1 1 1 1	cement (in	Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 1 2 2 2 1 2 1 1 1 1 1 1 1 1 1 1 1	cement (in	Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 2 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 The state of the content of	cement (in	Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
3085185 3408600 3408602 3774210 3774210 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	2 2 1 2 2 1 2 1 1 1 1 1 1 1 1 The state of the content of the cont	cement (in	Maximum Engine Powe (Kw) N/A Fuel Rate at Rated Spee (mm3/stroke)
3408602 3774210 3774210 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	2 2 1 2 2 1 2 1 1 1 1 1 1 1 1 The state of the content of the cont	cement (in	N/A Fuel Rate at Rated Spec (mm3/stroke)
3408602 3774210 3774210 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	2 2 1 2 2 1 2 1 1 1 1 1 1 1 1 The state of the content of the cont	cement (in	Fuel Rate at Rated Spee (mm3/stroke)
3774210 3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	2 1 2 2 1 1 1 1 1 1 1 1 The state of the sta	cement (in	(mm3/stroke)
3865312 4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 2 2 1 1 1 1 1 1 1 1 The state of the state	cement (in	
4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	2 2 1 1 1 1 1 1 1 The state of	cement (in	491.3
4044551 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60789	2 1 1 1 1 1 1 Engine Code Total Displa	cement (in	
4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 1 1 1 Engine Code Total Displa	cement (in	
4076493 4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 1 1 1 Engine Code Total Displa	cement (in	
4306515 4307466 4921797 4995444 4995444 SC60789	1 1 1 1 1 Engine Code Total Displa	cement (in	
4307466 4921797 4995444 4995444 SC60789	1 1 1 1 Engine Code Total Displa	cement (in	
4921797 4995444 4995444 SC60789 QSK50-G	1 1 1 Engine Code Total Displa	cement (in	
4995444 4995444 SC60789 QSK50-G	1 Engine Code Total Displa	cement (in	
4995444 SC60789 QSK50-G	1 Engine Code Total Displa	cement (in	
SC60789 QSK50-G	1 Engine Code Total Displa	cement (in	
QSK50-G	Engine Code Total Displa	cement (in	
	Total Displa	cement (in	
	Total Displa	cement (in	
3.16			
		50.513	
V-Shaped Engine			
Bore (mm)	Stroke (mm)	Rated Power (kW)	
159	159	1655	
ed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
1500	1800	N/A	
Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
5	5	521.9	
Turbocharged			
2	Aspiration D	Device	
		n Paranei	
	marger		
No	N. I. CT		
2	Number of E per cylinder	exhaust Valves	
ntion			
Both			
	Production I	End Date	
1	2 Non Waste Gate Turboo Both No No 2	Turbocharged 2 Non Waste Gate Turbocharger Both No No No Solution Number of Ference cylinder tion Both	Turbocharged Aspiration Device Configuration Parallel Non Waste Gate Turbocharger Both No No No No Number of Exhaust Valves per cylinder 2 tion

Pressure Sensor 2 3408602 1 (Kw) Turbo Charger 2 3774210 2 N/A	Engine Family	HCEXL050.AAD	Model Year	2017	
Fuel Injections	Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Fuel Injectors	Turbo Charger 1	2837528	2	J	J
Sensor 2872304 1 1 1 1 1 1 1 1 1		2867147	16		
Fuel Injection Pump	Sensor	2872279	1		
Fuel Injection Pump	Sensor	2872304	1		
Fuel Injection Pump	Fuel Injection Pump	2888749	1		
Sensor		2888798	1		
Sensor 305185			1		
Pressure Sensor 3408600			1		Rated Speed (RPM) 180
Pressure Sensor 2 3408602 1	Pressure Sensor 1	3408600	1		Maximum Engine Powe
Turbo Charger 2 3774210 2 9 Full Rate at Rated Spec (mm.3/stroke) 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			1		(Kw)
Turbo Charger 1 3774210 2		3774210	2		
Sensor 3865312 1	-	3774210	2		Fuel Rate at Rated Spee
Turbo Charger 1					*
Turbo Charger 2			_		474.2
Pressure Sensor 2					
Fuel Injection Pump					
Sensor					
Electronic Control Module 4921797 1 Electronic Control Module 4995444 1 Electronic Control Module 4995444 1 Software Calibration 8C60799 1 Engine Model #47			1		
Electronic Control Module 1			•		
Software Calibration 1			1		
Software Calibration 1 SC60799 1			1		
Engine Model #47 Engine Model			•		
Engine Model Olisplacement Per Cylinder (in liters) Singine Block Arrangement V-Shaped Engine Number of Cylinders Bore (mm) 16 159 159 159 159 159 Maximum Torque (N*m) 8780 1800 1800 1800 N/A Intermediate Test Speed (RPM) 0 5 Lower Tolerance of (RPM) 0 5 Torque at Maximum Speed (N*m) N/A Intermediate Test Speed (RPM) 0 5 Torque at Maximum Power (%) Maximum Power (%) Maximum Power (%) Number of Aspiration Devices 1 Sumber of Aspiration Devices Configuration Non Waste Gate Turbocharger Sharege Cooler Type Variable Valve Timing? No Variable Valve Lift? No Non Waste Gate Turbocharger Sales Area Both Production Start Date Engine Code Total Displacement (in liters) Stroke (mm) Rated Power (kW) 159 159 159 159 159 159 159 159 159 159		5000777	1		
Displacement Per Cylinder (in iters) 3.16 Engine Block Arrangement V-Shaped Engine Number of Cylinders Bore (mm) 16 159 159 1655 Maximum Torque (N*m) Speed at Maximum Torque (RPM) 8780 1800 1800 1800 1800 1800 N/A Intermediate Test Speed (RPM) 0 5 Maximum Power (%) Maximum Power (%) Maximum Power (%) Fuel Rate at Maximum Torque (mm3/stroke) 0 5 474.2 Method of Aspiration Devices Configuration Furbocharger Type (s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Sumber of Inlet Valves per yelinder 2 Production and Sales Information Both Production End Date Production End Date	Engine Model #47				
Engine Block Arrangement Number of Cylinders Bore (mm) 16 159 159 159 1655 Maximum Torque (N*m) 8780 Intermediate Test Speed (RPM) (RPM) 0 55 Maximum Power (%) 16 Lower Tolerance of (RPM) Maximum Power (%) 1800 N/A Intermediate Test Speed (RPM) Torque (mm3/stroke) 0 5 474.2 Method of Aspiration Devices Purbocharger Type(s) Charge Cooler Type Both Variable Valve Lift? No Number of Inlet Valves per cylinder Variable Valves Information Sales Area Both Production Start Date Production Start Date Stroke (mm) Rated Power (kW) Forque at Maximum Speed (N*m) N/A Furgue at Maximum Speed (N*m) Furgue at Maximum Speed	Engine Model	QSK50-G	Engine Code	e 3621:FR6879	
Number of Cylinders Bore (mm) Stroke (mm) Rated Power (kW)					
Maximum Torque (N*m) Speed at Maximum Torque (RPM) Speed at Maximum Torque (RPM) 1800 1800 N/A Intermediate Test Speed (RPM) Maximum Power (%) Maximum Power (%) Maximum Power (%) Torque (mm3/stroke) 0 5 5 5 474.2 Method of Aspiration Devices 2 Aspiration Device Configuration Power Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Valred Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date		V-Shaped Engine	,		
Maximum Torque (N*m) Speed at Maximum Torque (RPM) (RPM) Maximum Speed Test (RPM) (N*m) 8780 1800 1800 N/A Intermediate Test Speed (RPM) Maximum Power (%) Maximum Power (%) Torque (mm3/stroke) 0 5 5 474.2 Method of Aspiration Turbocharged Number of Aspiration Devices 2 Non Waste Gate Turbocharger Charge Cooler Type 8 Wariable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date	Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
Maximum Torque (N*m) Speed at Maximum Torque (RPM) (RPM) (RPM) (N*m) 8780 1800 1800 1800 N/A Intermediate Test Speed (RPM) Maximum Power (%) Maximum Power (%) Fuel Rate at Maximum (mm.3/stroke) 0 5 5 5 474.2 Method of Aspiration Devices Curbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 2 Production and Sales Information Sales Area Both Production Start Date Maximum Torque (RPM) N/A Fuel Rate at Maximum Torque (mm.3/stroke) Fuel Rate at Maximum Speed Torque (mm.3/stroke) Fuel Rate at Maximum Torque (
State Stat	Maximum Torque (N*m)			Torque at Maximum Speed	
Intermediate Test Speed (RPM) Number of Aspiration Devices Both Variable Valves per cylinder 2 Number of Inlet Valves per cylinder 2 Number of Inlet Valves per cylinder 2 Number of Sales Area Both Production Start Date Production End Date Pr	8780	· · ·	` '	` ´	
Method of Aspiration Turbocharged Number of Aspiration Devices Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? Variable Valve Lift? No Number of Inlet Valves per cylinder Typinder Both Production and Sales Information Sales Area Both Production End Date 1	Intermediate Test Speed	Lower Tolerance of	Upper Tolerance of	Fuel Rate at Maximum	
Method of Aspiration Number of Aspiration Devices Purbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valves per cylinder Valves per cylinder Both No Number of Exhaust Valves per cylinder Sales Area Both Production End Date Production End Date				-	
Number of Aspiration Devices 2 Configuration Device Configuration Device Configuration Device Configuration Device Configuration Device Configuration Parallel Furbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Number of Inlet Valves per cylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date			J	474.2	
Number of Aspiration Devices 2 Configuration Parallel Furbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Parallel Configuration Parallel Rounding Parallel Production Parallel No Number of Exhaust Valves per cylinder 2 Production End Date	viction of Aspiration	Turbochargeu	Aspiration I)evice	
Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Both Production End Date	Number of Aspiration Device	s 2	Configuration	on Parallel	
Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per Cylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Variable Valve Lift? No Number of Inlet Valves per Sylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Charge Cooler Type	Both			
Number of Inlet Valves per ylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Variable Valve Timing?	No			
Production and Sales Information Sales Area Production Start Date Production End Date		No			
Production and Sales Information Sales Area Production Start Date Production End Date	Number of Inlet Valves per		Number of I	Exhaust Valves	
Sales Area Both Production Start Date Production End Date		2	per cylinder	2	
Production Start Date Production End Date	Production and Sales Info	rmation			
Production Start Date Production End Date	Sales Area	Both			
Engine Parts	Production Start Date		Production 1	End Date	
	Engine Parts				
	-				

Date:	11	/1	5/2	01	6	N3	.57	7 • 1	2	PM	Γ
Date.	11	/ 1	-) / ∠	. () [()	().)) /		_	1 171	

Part Number 2837528	Part Quantity	Part Usage Start Date	Part Usage End Date
2837528			
	2		
2867147	16		
2872279	1		
2872304	1		
2888749	1		
2888798	1		
2888810	1		Rated Speed (RPM) 1800
3085185	1		Maximum Engine Power
3408600	1		(Kw)
3408602	1		N/A
3774210	2		Fuel Rate at Rated Speed
3774210	2		(mm3/stroke)
	1		474.2
	2		
4076493	1		
	1		
	1		
	•		
	1		
	1		
SC00844	1		
QSK50-G	=		
3.16	Total Displac liters)	cement (in 50.513	
V-Shaped Engine			
Bore (mm)	Stroke (mm)	Rated Power (kW)	
159	159	1655	
eed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
1800	1800	N/A	
Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
5	5	474.2	
Turbocharged			
	=	n Parallel	
	harger		
Both			
No			
2	Number of E per cylinder	Exhaust Valves	
ation			
Both			
2011	Production F	End Date	
]	2888749 2888798 2888810 3085185 3408600 3408602 3774210 3774210 3865312 4044551 4076493 4306515 4307466 4921797 4995444 4995444 SC60844 QSK50-G 3.16 V-Shaped Engine Bore (mm) 159 eed at Maximum Torque (RPM) 1800 Lower Tolerance of Maximum Power (%) 5 Turbocharged 2 Non Waste Gate Turboc Both No No	2888749	2888749

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		g
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		Rated Speed (RPM)
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 2	4044551	2		
Turbo Charger 1	4044551	2		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		
Engine Model #49				
Engine Model	QSK50-G	Engine Code	3622:FR6840	
Displacement Per Cylinder (in		Total Displac		
liters)	3.16	liters)	50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1655	1800
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	474.2	474.2
Method of Aspiration	Turbocharged			
-		Aspiration D	evice	
Number of Aspiration Devices	2	Configuratio		
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valves	
Production and Sales Inform	mation			
Sales Area	Both			
Production Start Date		Production E	and Date	
Engine Parts				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		Rated Speed (RPM)
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Turbo Charger 1	4044551	2		
Turbo Charger 2	4044551	2		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		
Engine Model #50				
Engine Model	QSK50-G	Engine Code	3622:FR6878	
Displacement Per Cylinder (in		Total Displac	ement (in	
liters)	3.16	liters)	50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1655	1800
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	474.2	474.2
Method of Aspiration	Turbocharged			
P		Aspiration D	evice	
Number of Aspiration Devices	2	Configuration	n Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	xhaust Valves	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date		Production E	nd Date	
Engine Parts				
<u> </u>				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2	<u> </u>	<u> </u>
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		Rated Speed (RPM) 1500
Pressure Sensor 2	3408600	1		Maximum Engine Power
Sensor	3865312	1		(Kw)
Turbo Charger 1	4044551	2		N/A
Turbo Charger 2	4044551	2		Fuel Rate at Rated Speed
Pressure Sensor 1	4076493	1		(mm3/stroke)
Fuel Injection Pump	4306515	1		492
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60796	1		
Software Calibration 1	SC60843	1		
Engine Model #51	500015	•		
	OSKEO C	Engine Code	2622.ED 69796	,
Engine Model	QSK50-G	Engine Code		ſ
Displacement Per Cylinder (in liters)	3.16	Total Displac liters)	50.513	
Engine Block Arrangement	V-Shaped Engine			
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1476	
Maximum Torque (N*m) S	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
9396	1500	1500	N/A	
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
0	5	5	492	
Method of Aspiration	Turbocharged			
		Aspiration D	evice	
Number of Aspiration Devices	2	Configuratio	n Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Inform	nation			
Sales Area	Both			
Production Start Date	Dom	Production I	End Date	
Engine Parts				

Turbo Changer I 2837528 2 Fuel Injectors 2867147 16 Sensor 2872304 1 Fuel Injection Pump 288879 1 Fuel Injection Pump 288879 1 Fuel Injection Pump 2888810 1 Sensor 3055185 1 Sensor 33055185 1 Turbo Changer 1 4044551 2	Engine Family	HCEXL050.AAD	Model Year	2017	
Fuel Injectors	Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Sensor 2872304 1	Turbo Charger 1	2837528	2		
Piuel Injection Pump	Fuel Injectors	2867147	16		
Fuel Injection Pump	Sensor	2872304	1		
Paul Injection Pump 2888810	Fuel Injection Pump	2888749	1		
Sensor 3085185	Fuel Injection Pump	2888798	1		
Pressure Sensor 2 3408600	Fuel Injection Pump	2888810	1		
Sensor 3865312 1	Sensor	3085185	1		Rated Speed (RPM) 1800
Turbo Charger 2	Pressure Sensor 2	3408600	1		Maximum Engine Power
Turbo Charger 1 4044551 2	Sensor	3865312	1		
Pressure Sensor 1	Turbo Charger 2	4044551	2		
Pressure Sensor 40/6493	Turbo Charger 1	4044551	2		=
Sensor	Pressure Sensor 1	4076493	1		
Electronic Control Module 4991797 1 Electronic Control Module 4995444 1 Software Calibration SC60843 1 Engine Model #52 Engine Model #52 Engine Model QSK50-G Engine Code 3623:FR6835 Displacement Per Cylinder (Initiers) 3.16 Total Displacement (Initiers) 50.513 Engine Block Arrangement V-Shaped Engine V-Shaped Engine Total Displacement (Initiers) 159 159 1655 Maximum Torque (N*m) Speed at Maximum Torque (RPM) 1800 N/A Intermediate Test Speed (RPM) 1800 N/A Intermediate Test Speed (RPM) 1800 N/A Intermediate Test Speed (RPM) Turbocharged Variable Valve Timing? Non Waste Gate Turbocharger Type(s) Non Waste G	Fuel Injection Pump	4306515	1		471.2
Electronic Control Module 4995444 1 Software Calibration SC60796 1 SOftware Calibration SC60796 1 SOftware Calibration SC60843 SOftware Calibration SC608	Sensor	4307466	1		
Software Calibration 1 SC60796 1		4921797	1		
Engine Model #52 Engine Model #52 Engine Model	Electronic Control Module 1	4995444	1		
Engine Model #52 Engine Model	Software Calibration 1	SC60796	1		
Engine Model QSK50-G Engine Code 3623:FR6835 Displacement Per Cylinder (in liters) 3.16 Engine Block Arrangement V-Shaped Engine Number of Cylinders Bore (mm) Stroke (mm) Rated Power (kW) 16 159 159 Maximum Torque (N*m) Speed at Maximum Torque (RPM) (RPM) 8780 1800 1800 1800 N/A Intermediate Test Speed (RPM) Maximum Power (%) Maximum Power (%) Fuel Rate at Maximum (RPM) 0 5 5 5 471.2 Method of Aspiration Devices 2 Method of Aspiration Devices 2 Number of Aspiration Devices 2 Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Both Production Start Date Engine Code (Intermet (in liters) 3623:FR6835 Total Displacement (in liters) 50.513 Stoal Displacement (in liters) 50.513 Stroke (mm) Rated Power (kW) 1650-1850 Rated Power (kW) 1650 Rated Power (kW) 1650-1850 Rated	Software Calibration 1	SC60843	1		
Displacement Per Cylinder (in liters) 3.16 Engine Block Arrangement Number of Cylinders Bore (mm) 16 159 159 159 159 159 159 159	Engine Model #52				
Displacement Per Cylinder (iters) 3.16 Total Displacement (in liters) 50.513 Engine Block Arrangement V-Shaped Engine Number of Cylinders Bore (mm) Stroke (mm) Rated Power (kW) 16 159 159 1655 Maximum Torque (N*m) Speed at Maximum Torque (RPM) (RPM) (N*m) 8780 1800 1800 1800 N/A Intermediate Test Speed (RPM) (N*m) Power (%) (RPM) (N*m) 0 5 5 5 471.2 Method of Aspiration Devices 2 Mounder of Aspiration Devices 2 Number of Aspiration Devices 2 Configuration Device Configuration Parallel Turbocharger Type (s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Number of Inlet Valves per cylinder 2 Production and Sales Information Both Production Start Date Stroke (mm) Rated Power (kW) Aspiration Device Configuration Device Configurati	Engine Model	QSK50-G	Engine Code	3623:FR6835	
Number of Cylinders 16 159 159 159 1655 Maximum Torque (N*m) 8780 1800 1800 1800 1800 N/A Intermediate Test Speed (RPM) (RPM) 0 5 Maximum Power (%) Maximum Power (%) Maximum Power (%) Maximum Power (%) Turbocharged Method of Aspiration Non Waste Gate Turbocharger Charge Cooler Type Variable Valve Timing? No Number of Inlet Valves per cylinder Sales Area Both Production Start Date Parallel Production End Date	Displacement Per Cylinder (in	3.16	Total Displa	cement (in	
Maximum Torque (N*m) Speed at Maximum Torque (RPM) Speed Test (RPM) Speed Test (RPM) N/A Intermediate Test Speed (RPM) Speed Tolerance of (RPM) Speed Test (RPM) N/A Intermediate Test Speed (RPM) Speed Test (RPM) Speed Test (RPM) N/A Intermediate Test Speed (RPM) Speed Test (RPM) Speed Test (RPM) N/A Intermediate Test Speed (RPM) Speed Test (RPM) Speed Test (RPM) N/A Intermediate Test Speed (RPM) Speed Test (RPM) Speed	Engine Block Arrangement	V-Shaped Engine			
Maximum Torque (N*m) Speed at Maximum Torque (RPM)					
RPM					
Intermediate Test Speed (RPM) Maximum Power (%) Fuel Rate at Maximum Torque (mm3/stroke) 471.2 Method of Aspiration Turbocharged Aspiration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date	Maximum Torque (N*m) S				
(RPM) Maximum Power (%) Maximum Power (%) Torque (mm3/stroke) 0 5 5 471.2 Method of Aspiration Turbocharged Aspiration Device Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder Turbocharger Number of Sales Area Both Production Start Date Production End Date	8780				
Method of Aspiration Number of Aspiration Devices Purbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder Cylinder Sales Area Both Production Start Date Turbocharger Aspiration Device Configuration Parallel Nanallel No Number of Exhaust Valves per cylinder 2 Production End Date			Upper Tolerance of Maximum Power (%)		
Number of Aspiration Devices 2 Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production End Date	0	5	5	471.2	
Number of Aspiration Devices 2 Configuration Parallel Turbocharger Type(s) Non Waste Gate Turbocharger Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Configuration Parallel	Method of Aspiration	Turbocharged			
Charge Cooler Type Both Variable Valve Timing? No Variable Valve Lift? No Number of Inlet Valves per Sulinder 2 Number of Exhaust Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Number of Aspiration Devices	2	Aspiration D Configuration	Device on Parallel	
Variable Valve Timing? Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Charge Cooler Type	Both	-		
Variable Valve Lift? No Number of Inlet Valves per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	Variable Valve Timing?	No			
cylinder 2 per cylinder 2 Production and Sales Information Sales Area Both Production Start Date Production End Date	-	No			
Sales Area Both Production Start Date Production End Date		2			
Production Start Date Production End Date	Production and Sales Inforr	nation			
Production Start Date Production End Date	Sales Area	Both			
Engine Parts			Production I	End Date	
Lugue I at to	Engine Parts				

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity Part Usage Start Date		Part Usage End Date
Turbo Charger 1	2837528	2		
Fuel Injectors	2867147	16		
Sensor	2872304	1		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		Rated Speed (RPM)
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Turbo Charger 1	4964172	2		
Turbo Charger 2	4964172	2		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60790	1		
Engine Model #53				
Engine Model	QSK50-G	Engine Code	3624:FR6836	
Displacement Per Cylinder (in liters)	-	Total Displac		
Engine Block Arrangement	V-Shaped Engine	11013)	20.010	
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1749	1800
Maximum Torque (N*m) S	Speed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
9278	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	499.2	499.2
Method of Aspiration	Turbocharged			
	Turoomargou	Aspiration D	evice.	
Number of Aspiration Devices	2	Configuratio	n Parallel	
Turbocharger Type(s)	Non Waste Gate Turboo	charger		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of E per cylinder	Exhaust Valves	
Production and Sales Infor	mation			
Sales Area	Both			
Production Start Date		Production I	End Date	
Engine Parts				
Linginio I air as				

Part Number	Part Quantity Part Usage Start Date		Part Usage End Date
2837527	2		
2837527	2		
2837528	2		
2881088	16		
2888749	1		
2888798	1		
2888810	1		Rated Speed (RPM) 150
3085185	1		Maximum Engine Power
3408600	1		(Kw)
3408647	1		N/A
3865312	1		Fuel Rate at Rated Speed (mm3/stroke)
4076493	1		440.2
4306515	1		440.2
4921797	1		
4995444	1		
SC60792	1		
QSK50-G	Engine Code	3625:FR6837	
3.16	Total Displace liters)	cement (in 50.513	
V-Shaped Engine			
Bore (mm)	Stroke (mm)	Rated Power (kW)	
159	159	1581	
peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	
1500	1500	N/A	
Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	
5	5	440.2	
Turbocharged			
C	Aspiration D	Pevice	
2	Configuratio	n Parallel	
Non Waste Gate Turboo	charger		
Both			
No			
No			
2	Number of E per cylinder	Exhaust Valves	
nation			
Both			
	Production I	End Date	
	2837527 2837528 2837528 2881088 2888749 2888798 2888810 3085185 3408600 3408647 3865312 4076493 4306515 4921797 4995444 SC60792 QSK50-G 3.16 V-Shaped Engine Bore (mm) 159 peed at Maximum Torque (RPM) 1500 Lower Tolerance of Maximum Power (%) 5 Turbocharged 2 Non Waste Gate Turbock Both No No 2	2837527	2837527 2 2837528 2 2881088 16 2888749 1 2888798 1 2888810 1 3085185 1 3408600 1 3408647 1 3865312 1 4076493 1 4306515 1 4921797 1 4995444 1 SC60792 1 QSK50-G Engine Code 3625:FR6837 Total Displacement (in liters) 50.513 V-Shaped Engine Bore (mm) Stroke (mm) Rated Power (kW) 159 159 1581 V-Shaped Engine Bore (mm) Stroke (mm) Rated Power (kW) 159 159 1581 Lower Tolerance of (RPM) 1500 N/A Lower Tolerance of Maximum Power (%) Fuel Rate at Maximum Speed (N*m) 1500 1500 N/A Lower Tolerance of Maximum Power (%) Fuel Rate at Maximum Torque (mm3/stroke) 5 5 440.2 Turbocharged 2 Aspiration Device Configuration Parallel No

Engine Family	HCEXL050.AAD	Model Year	2017	
Part Name	Part Number	Part Quantity	Part Usage Start Date	Part Usage End Date
Turbo Charger 1	2837528	2		
Turbo Charger 2	2837528	2		
Turbo Charger 1	2837528	2		
Sensor	2872304	1		
Fuel Injectors	2881088	16		
Fuel Injection Pump	2888749	1		
Fuel Injection Pump	2888798	1		Rated Speed (RPM)
Fuel Injection Pump	2888810	1		
Sensor	3085185	1		
Pressure Sensor 2	3408600	1		
Sensor	3865312	1		
Pressure Sensor 1	4076493	1		
Fuel Injection Pump	4306515	1		
Sensor	4307466	1		
Electronic Control Module 1	4921797	1		
Electronic Control Module 1	4995444	1		
Software Calibration 1	SC60794	1		
Engine Model #55				
Engine Model	QSK50-G4	Engine Code	2771:FR6726	
Displacement Per Cylinder (in iters)	3.16	Total Displac	ement (in 50.513	
Engine Block Arrangement	V-Shaped Engine	,		
Number of Cylinders	Bore (mm)	Stroke (mm)	Rated Power (kW)	
16	159	159	1655	1800
Maximum Torque (N*m) Sp	peed at Maximum Torque (RPM)	Maximum Speed Test (RPM)	Torque at Maximum Speed (N*m)	Maximum Engine Power (Kw)
8780	1800	1800	N/A	N/A
Intermediate Test Speed (RPM)	Lower Tolerance of Maximum Power (%)	Upper Tolerance of Maximum Power (%)	Fuel Rate at Maximum Torque (mm3/stroke)	Fuel Rate at Rated Speed (mm3/stroke)
0	5	5	497	497
Method of Aspiration	Turbocharged			
Number of Aspiration Devices	2	Aspiration De Configuration	e vice n Parallel	
Furbocharger Type(s)	Non Waste Gate Turboo	=		
Charge Cooler Type	Both			
Variable Valve Timing?	No			
Variable Valve Lift?	No			
Number of Inlet Valves per cylinder	2	Number of Exper cylinder	xhaust Valves	
Production and Sales Inform		per cymiaei	-	
Sales Area	Both			
Sales Area Production Start Date	Dom	Production E	nd Date	

Non-Methane Hydrocarbons

Engine Family	HCEXL050.AAD	Model Year		2017	
Part Name	Part Number	Part Quantity	Part Usag	e Start Date	Part Usage End Date
Turbo Charger 1	2837528	2			
Sensor	2872279	1			
Sensor	2872304	1			
Fuel Injection Pump	2888749	1			
Fuel Injection Pump	2888798	1			
Fuel Injection Pump	2888810	1			
Sensor	3085185	1			
Pressure Sensor 1	3408600	1			
Sensor	3865312	1			
Turbo Charger 2	4044551	2			
Turbo Charger 1	4044551	2			
Pressure Sensor 2	4076493	1			
Sensor	4307466	1			
Electronic Control Module 1	4921797	1			
Fuel Injectors	4964172	16			
Electronic Control Module 1	4995444	1			
Software Calibration 1	SC60386	1			
Software Calibration 1	SC60602	1			
Software Calibration 1	SC60603	1			
Software Calibration 1	SC61074	1			
Durability Information					
DF Determination Factor	Determined by Manufacturer				
Durability Engines					
Engine Name	Engine Code	Engi	ne Id	Engine Serv	ice Accumulation in hours
SDA6D140E-3	2C09	3628	3579		1400
Deterioration Factors					
P	ollutant Name	Deteriorat	ion Factor	Deteri	oration Factor Type
Ca	arbon Monoxide	0.0	07		Additive
N	litrogen Oxides	()		Additive
	Smoke-Accel	0.	5		Additive
Pa	articulate Matter	0.0	13		Additive
	Smoke-Peak	0.	5		Additive
	Smoke-Lug	1			Additive
		_			

1 0

Additive

Date: 11/15/2016 03:57:12 PM

Certification Summary Information Report

Engine Family HCEXL050.AAD **Model Year** 2017 **Carryover Test Information** Test Dataset #1 Test data for a current engine model Test Data Type in this Engine Family Manufacturer Test Dataset Verify Test Dataset Number FCEXLM0005163 Number **Engine Model** QSK19-G **Engine Code** 1485:FR4446 **Engine Displacement (in Engine Id** 33170354 18.942 Number of hours Engine was run Crankcase Emission CCEs Routed into the Exhaust Downstream prior to test 125 **Discharge Path** of After Treatment **Test Date** 10/28/2005 Test Fuel 300-500 ppm Low Sulfur Diesel Special Test Procedure Used No Test Lab Name CIC Emissions Lab **Test Lab Code** 4 **Engine Operation** Variable Speed Steady-State Cycle Type Steady-State 8-Mode Cycle Steady-state Cycle Work Steady-State Modal Testing Type Ramped-Modal Testing (kW-hr) Transient Test Required No **Transient Hot Start Cycle Work** Transient Cold Start Cycle (kW-hr) Work (kW-hr) **Devices Regenerated during** Steady State Test (Ramped Model) None **Devices Regenerated during Cold** Start of a Transient Test None **Devices Regenerated during Hot** Start of a Transient Test None Test Comments **Smoke Test Results** Smoke Type Test Result (Initial) (%) **Certification Level (%)** EPA Standard (%) Pass/Fail Indicator Smoke-Peak 13.6 14 50 Pass Smoke-Accel 11.9 12 20 Pass 3 Smoke-Lug 2.1 15 Pass **Steady-State Ramped Modal Test Results Pollutant Name** Test Result (Initial) (g/kW-hr) Carbon Dioxide 705 Nitrogen Oxides 5.65 Nitrogen Oxides plus Non-Methane Hydrocarbons Particulate Matter 0.063 Carbon Monoxide 1.75 Non-Methane Hydrocarbons 0.14 Certification Level Steady-State Ramped Modal Test Results Test Result (Adjusted) Certification Emission EPA Standard Limit **Pollutant Name** Family Emission Pass/Fail Indicator (g/kW-hr) Result (g/kW-hr) (g/kW-hr) Limit (g/kW-hr) Particulate Matter 0.063 0.08 0.20 Pass Nitrogen Oxides 5.65 5.65 Carbon Monoxide Pass 1.75 1.8 3.5 Carbon Dioxide 705 705.00 Non-Methane 0.14 0.14 Hydrocarbons Nitrogen Oxides plus 5.8 6.4 Pass Non-Methane Hydrocarbons

Date: 11/15/2016 03:57:12 PM

Certification Summary Information Report

Engine Family HCEXL050.AAD **Model Year** 2017 **Manufacturer Test Information** Test Dataset #1 Test data for a current engine model Test Data Type in this Engine Family **Manufacturer Test Dataset** Verify Test Dataset Number HCEXLM0008028 Number **Engine Model** QSK19-G **Engine Code** 1485:FR4446 **Engine Displacement (in Engine Id** 33170354 18.942 Number of hours Engine was run Crankcase Emission CCEs Routed into the Exhaust Downstream prior to test 125 **Discharge Path** of After Treatment **Test Date** 10/28/2005 **Test Fuel** 300-500 ppm Low Sulfur Diesel Special Test Procedure Used No Test Lab Name CIC Emissions Lab **Test Lab Code** 4 **Engine Operation** Variable Speed Steady-State Cycle Type Steady-State 8-Mode Cycle Steady-state Cycle Work **Steady-State Modal Testing Type** Ramped-Modal Testing (kW-hr) 78.07 Transient Test Required No **Transient Hot Start Cycle Work Transient Cold Start Cycle** (kW-hr) Work (kW-hr) **Devices Regenerated during** Steady State Test (Ramped Model) None **Devices Regenerated during Cold Start of a Transient Test** None **Devices Regenerated during Hot** Start of a Transient Test None Test Comments

Smoke Test Results

Smoke Type	Test Result (Initial) (%)	Certification Level (%)	EPA Standard (%)	Pass/Fail Indicator
Smoke-Peak	13.6	14	50	Pass
Smoke-Accel	11.9	12	20	Pass
Smoke-Lug	2.1	3	15	Pass

Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Initial) (g/kW-hr)
Carbon Dioxide	705
Nitrogen Oxides plus Non-Methane Hydrocarbons	
Particulate Matter	0.063
Carbon Monoxide	1.75
Nitrogen Oxides	5.65
Non-Methane Hydrocarbons	0.14

Certification Level Steady-State Ramped Modal Test Results

Pollutant Name	Test Result (Adjusted) (g/kW-hr)	Certification Emission Result (g/kW-hr)	EPA Standard Limit (g/kW-hr)	Family Emission Limit (g/kW-hr)	Pass/Fail Indicator
Carbon Dioxide	705	705.			
Nitrogen Oxides plus Non-Methane Hydrocarbons		5.8	6.4		Pass
Particulate Matter	0.063	0.08	0.20		Pass
Carbon Monoxide	1.75	1.8	3.5		Pass
Nitrogen Oxides	5.65	5.65			
Non-Methane Hydrocarbons	0.14	0.14			

Date: 11/15/2016 03:57:12 PM Certification Summary Information Report

Date: 11/15/2016 03:57:1	2 PM Cert	fication Summary I	nformation Report		
Engine Family	HCEXL050	.AAD	Model Year	2017	
Test Dataset #2					
Test Data Type	Test data for in this Engir	a current engine model ne Family			
Verify Test Dataset Nun	nber HCEXLM0	008027	Manufacturer Test Datase Number		
Engine Model	QSK19-G	500027	Engine Code	1485:FR4446	
Engine Id	33160795		Engine Displacement (in liters)	18.942	
Number of hours Engine prior to test	e was run 125		Crankcase Emission Discharge Path	CCEs Routed into of After Treatment	the Exhaust Downstrean
Test Date	10/17/2005				
Test Fuel					
300-500 ppm Low Sulfur	Diesel				
Special Test Procedure V	U sed No				
Test Lab Name	CIC Emission	ons Lab	Test Lab Code	4	
Engine Operation	Constant Sp	eed	Steady-State Cycle Type	Steady-State 5-Mo	de Cycle
Steady-State Modal Test	0 11	odal Testing	Steady-state Cycle Work (kW-hr)	78.07	
Transient Test Required					
Transient Hot Start Cyc (kW-hr)			Transient Cold Start Cycle Work (kW-hr)	e 	
Devices Regenerated du Steady State Test (Ram _l	ring oed Model) None				
Devices Regenerated du Start of a Transient Test	ring Cold None				
Devices Regenerated du Start of a Transient Test	ring Hot None				
Test Comments					
Steady-State Ramped	Modal Test Results				
	Pollutant Name		Test I	Result (Initial) (g/kW	-hr)
Non-Methane Hydrocarbons		0.19			
Carbon Monoxide		1.17			
Nitrogen Oxides		5.95			
Particulate Matter		0.07			
Carbon Dioxide			730		
Nitrogen Oxi Certification Level St	des plus Non-Methane H	•			
Pollutant Name	-	Certification Emission Result (g/kW-hr)	EPA Standard Limit (g/kW-hr)	Family Emission Limit (g/kW-hr)	Pass/Fail Indicator
Non-Methane Hydrocarbons	0.19	0.19			
Carbon Monoxide	1.17	1.2	3.5		Pass
Nitrogen Oxides	5.95	5.95			
Particulate Matter	0.07	0.08	0.20		Pass
Carbon Dioxide	730	730.			
Nitrogen Oxides plus Non-Methane Hydrocarbons		6.1	6.4		Pass



Customer Engineering Bulletin

Title: QSK50 EPA Tier 2 G-Drive Mechanical Product Information		o Maahaniaal	This CEB is for the following applications:		
		☐ Automotive ☐ Industrial ☐ Marine			
			⊠ G-Drive		
Date: 10 February 2016		Refer to CEB00044 for Safety Practices, Guidelines and Procedures		CEB Number: 00093	
Engine models included: QSK50-G NR2 (D283039GX03)					
Owner: Mark Bosserman Approver: per P		rocedure GCE-AS-1	Page 1 of 15		

This CEB supersedes CEB00093 dated 11 January 2016.

Introduction

This CEB introduces the Quantum QSK50 engine at Tier 2 emission levels from Cummins Inc. The QSK50 is a 16 cylinder engine with a 50 liter displacement. The engine has been designed to meet U.S. EPA Tier 2 mobile off-highway emission levels. The U.S. EPA Tier 2 mobile off-highway emission requirements became effective January 1, 2006 for ratings above 560 kW (751 hp), and expired January 1, 2011. These Tier 2 ratings are still available for stationary emergency application under the NSPS rule and for mobile application using the TPEM program.

The upgraded design includes a new high pressure Modular Common Rail fuel System and advanced electronic control module (ECM). New injectors, pistons, turbos, and valve covers have also been incorporated into the configuration. A 2-pump, 2-loop Low Temperature Aftercooling (LTA) system will be utilized to deliver the intake manifold temperatures that are required for Tier 2 emission levels.

Purpose

The purpose of this document is to provide information about the hardware and performance of the QSK50, Tier 2 engine platform.

Table of Contents

Introduction	
Purpose	1
Table of Contents	
Base Engine Discussion	3
Performance	
Fuel Ratings and Altitude Capability	3
Engine Characteristics	3
Engine Envelope	3
Base Engine Components	3
Cylinder Block	3
Crankshaft	3
Camshaft	4
Cam Followers	4
Piston	4
Cylinder Head	4
Rocker Levers and Rocker Lever Housing	5
Valve Cover	5
Cooling System	6
Engine Coolant Loop	6
Aftercooler Coolant Loop	
Coolant Inlet and Outlet Connections	7
Other customer coolant option	8
Air Handling and Exhaust System	8
Air Intake	8
Turbochargers	8
Compressor Inlet and Exhaust Connections	9
Lubrication System	9
Filtration	9
Breather	9
Fuel System	
Operational Overview	9
Electronic Injector	10
Fuel Pump	
Fuel Filter Head and Fuel Filters	11
Fuel Coolers	
Fuel Supply and Drain Connections	13
Electronic Engine Control System	13
Customer Option Discussion	14
Engine Configuration	
Pricing Specs and Product IDs	14
Customer Option Changes	14
Accessory Drive Pulley	14
Cabin Heater Plumbing	
Installation Recommendations	15
Service Publications	15
Revision History	15

Base Engine Discussion

Performance

The fuel ratings available for the QSK50 Tier 2 engine are based on the KTA50 engine ratings. The performance parts have been developed to meet Tier 2 emission levels, achieve the best possible fuel consumption, and achieve similar transient response to the KTA50.

Fuel Ratings and Altitude Capability

For the latest Fuel Ratings and altitude capability please refer to the link below.

https://gce.cummins.com/pgce/pg_main/g-drive_global_index.html

Engine Characteristics

Configuration	D283039GX03
Displacement	50 liter (3067 in ³)
Bore	158.75 mm (6.25 in)
Stroke	158.75 mm (6.25 in)
Weight	5410 kg (11927 lb) [est. dry]
Cylinder Configuration	16 cylinder (V-angle 60°)

Engine Envelope

Envelope Description	Dimension
Overall Height above the center line of crankshaft	1158 mm (45.6 in)
Overall Height below the center line of crankshaft	745 mm (29.3 in)
Overall Length from rear face of flywheel housing to fan drive mounting surface	2581 mm (101.6 in)
Overall Width at widest point	1492 mm (58.7 in)

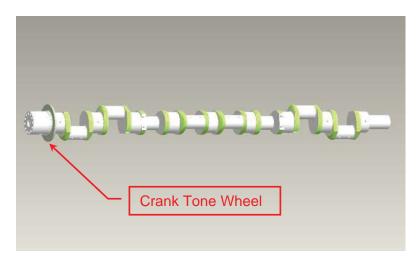
Base Engine Components

Cylinder Block

The existing KTA50 cylinder block has been modified to include an additional turbo oil supply port for the QSK50. The KTA50 will also use this new modified block. The KTA50 will have a plug sealing this port.

Crankshaft

The QSK50 utilizes a crankshaft based upon the current KTA50 crankshaft. The QSK50 crankshaft includes a tone wheel that is pressed on to the rear of the crankshaft (see Figures 1 and 2). The tone wheel works with the engine crank position sensor to provide engine speed and position information to the ECM. The tone wheel is timed to the crankshaft via a key slot.



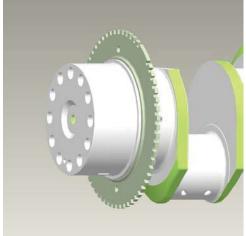


Figure 1 Figure 2

Camshaft

The existing KTA50 camshaft is utilized.

A single piece camshaft cover will continue to be used for this engine configuration.

Cam Followers

A modified version of the KTA50 series cam follower assembly has been incorporated into the new engine configuration. The center injector follower has been removed and a spacer has been added since the injectors are no longer mechanically actuated (see Figure 3).

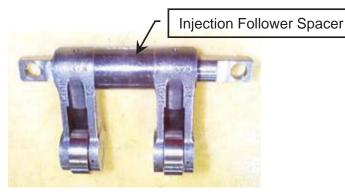


Figure 3

Piston

Ferrous Cast Ductile Iron (FCD) pistons have been incorporated into the new engine configuration. FCD pistons are also used on all other high horsepower engine products. The new piston has a compression ratio of 14.5:1.

Cylinder Head

A modified version of the KTA50 series cylinder head has been incorporated into the new engine configuration. The cylinder head has been modified to accommodate the new injectors, valve guides, valve stem seals, and fuel drain lines.



Fuel Drain Port

Figure 4

Rocker Levers and Rocker Lever Housing

The QSK50 utilizes rocker levers very similar to the rocker levers on KTA50. The difference is the removal of the injector push tubes and rocker levers (see Figure 5). A spacer is used in place of the rocker lever.

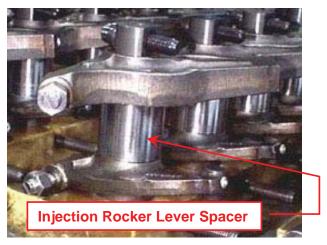


Figure 5

The QSK50 rocker lever housing remains largely unchanged from the KTA50 rocker lever housing. The key difference is the upgrade to a four bolt mounting arrangement for the valve cover to improve sealing.

Valve Cover

A new cast aluminum valve cover has been designed to accommodate the new injectors (see Figure 6). A four bolt clamping pattern will be employed for the new cover.



Figure 6

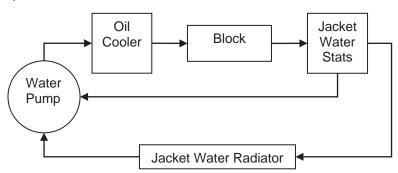
Cooling System

The cooling system is a two pump / two loop system that requires both an engine coolant loop radiator and a low temperature aftercooling (LTA) radiator.

The total system heat rejection has increased from the KTA50 model as a result of the revised combustion characteristics required to meet Tier 2 EPA emission levels. Items that contribute to this are increased turbocharger compressor outlet temperatures and increased air flow. However, maximum coolant temperature (top tank temperature) remains unchanged at 220 °F.

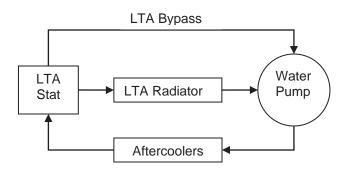
Engine Coolant Loop

The two pump / two loop cooling system employed on the QSK50 is different from the KTA50 pump / two loop and one pump / two loop cooling system. As mentioned previously the LTA aftercoolers are located on their own loop. The main engine loop now consists of the oil cooler, engine block, jacket water thermostats and water pump.



Aftercooler Coolant Loop

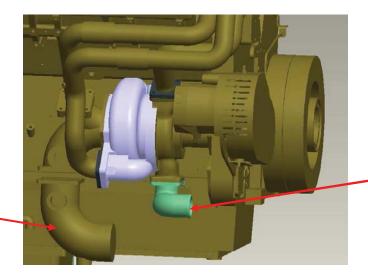
The QSK50 uses an aftercooler similar to the aftercooler used on the KTA50. (An aftercooler is a coolant-to-air heat exchanger used to reduce the temperature of the air entering the intake manifold.) Unlike the two pump / two loop KTA50 ratings, the coolant that is supplied to the QSK50 aftercooler core is on a separate loop from the engine coolant. This coolant loop must have its own radiator or remote heat exchanger. The aftercooler radiator must be designed to provide coolant cold enough to cool the intake air to 60 °C (140 °F) on a 25 °C (77 °F) ambient day. Maximum inlet water temperature to the aftercoolers is 65 °C (150 °F) on a 25 °C (77 °F) ambient day.



Common Cooling System Expansion Tank is required based on the Tier 2 water pump design. The new pump incorporates two impellers, which are the jacket water and low temperature aftercooling circuits, onto a single shaft. A maximum of 3 gal/min is transferred from the low temperature aftercooling circuit to the jacket water circuit within the pump assembly; therefore a common expansion tank (top tank) or a balance line between expansion tanks (top tanks) is required.

Coolant Inlet and Outlet Connections

The coolant inlet and outlet connections are located in the same areas as the KTA50 water inlets and outlets. The connections have changed slightly. Please refer to the installation drawing for more detailed information.



Low temperature aftercooler inlet connection

Jacket water inlet connection

Other customer coolant option

Corrosion filters will continue to be required and remain unchanged.

Air Handling and Exhaust System

QSK50 engines with single stage turbo charging will utilize two Holset HX82 turbochargers in conjunction with a modified KTA50 exhaust manifold.

Air Intake

Air mass flow has increased by approximately 11% over the KTA50 as a result of the new turbocharger. The intake air restriction remains unchanged. (See applicable data sheets for more information.)

Turbochargers

The Holset HX82 turbocharger employs both a larger compressor and extended compressor inlet when compared to the Holset HC5A employed on the KTA50. This technology is referred to as a Map Width Enhanced (MWE) compressor inlet (see Figure 7). The larger compressor is required to provide higher air flows to meet performance requirements while meeting Tier 2 emission levels. The extended inlet flange, however, is required to provide improved turbo stability at varying operating speeds by reducing air flow recirculation.



Figure 7

Compressor Inlet and Exhaust Connections

The turbo intake and exhaust connections for the single stage QSK50 engine configuration are listed below.

Compressor Intake Connection: 139 mm (5.5 in) Turbine Exhaust Outlet Connection: 170.7 mm (6.72 in)

The recommended exhaust piping size is 8 in (inner diameter). Exhaust restriction limits are on the datasheet for the static pressure measured with this piping size.

Lubrication System

Filtration

A recently released lube oil filter head option will be used for the new engine configuration. The option utilizes a filter head with an adapter that accommodates four LF9024 Venturi Combo lube filters. The LF9024 lube filter is a full flow with bypass filter from Fleetguard that provides improved filtration. The filter option is also common with other engine platforms, such as the QSK45, QSK60, and QSK78.

Breather

The breather arrangement on the QSK50 is common with the KTA50.

Fuel System

The QSK50 Tier 2 engine incorporates a new Cummins high pressure fuel pump and Modular Common Rail fuel System (MCRS). The fuel pump, solenoid controlled electronic injectors, and the engine electronic control module provide full authority electronic control for fuel delivery; thus, both injection pressure and timing can be accurately controlled.

Operational Overview

The new MCRS utilizes an electric priming pump, which is integrated with the off-engine fuel filter head and is controlled and powered by the engine ECM. During starting the electric priming pump pulls fuel from the tank through the Stage-1 fuel filters. The priming pump pressurizes the inlet to the mechanically driven gerotor pump. After the engine starts, the electric lift pump is shut off and bypassed so that the gerotor draws fuel directly from the tank through the Stage-1 filter.

The gerotor pump on the rear of the high pressure pump supplies approximately 100 psi of fuel pressure through the Stage-2 fuel filter and to the high pressure pump. The pump pressurizes the fuel to the desired injection pressure. This is defined by the software calibration and controlled by the inlet metering valve (IMV). Pressure at the outlet of the pump can be as high as 1600 bar (23200 psi). The fuel is then delivered to the fuel injectors. Double wall fuel lines are used to deliver fuel from the fuel pump and to each of the 16 injectors, which are plumbed in series. (See Figure 8.)

Note: External fuel shutoff valves are no longer required because the injectors are electronically actuated. They will not deliver fuel if the emergency stop or the run/stop switch is in the stop position.

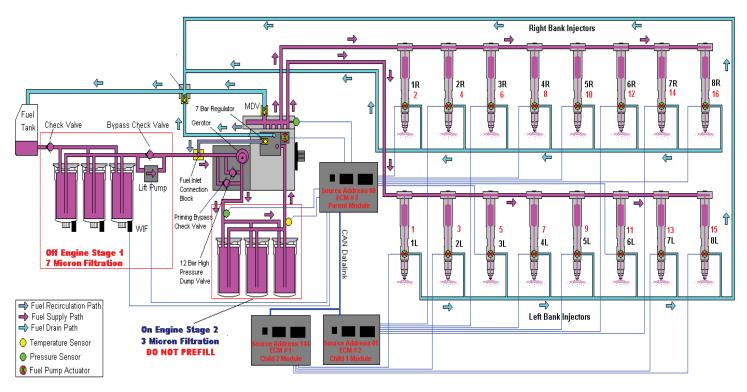


Figure 8 Modular common rail fuel system flow diagram

Electronic Injector

New electronically actuated injectors have been incorporated into the new configuration for advanced fueling and timing control (see Figures 9 and 10). The new injector is capable of precise and accurate fuel metering and timing control. Each injector now includes its own integrated accumulator, which helps to eliminate pressure pulsation between injectors and improve stability. As such, the injectors can now be connected in series as opposed to needing a large common fuel rail and being connected in parallel; thus, the new system has become a modular common rail system (MCRS).



Figure 9

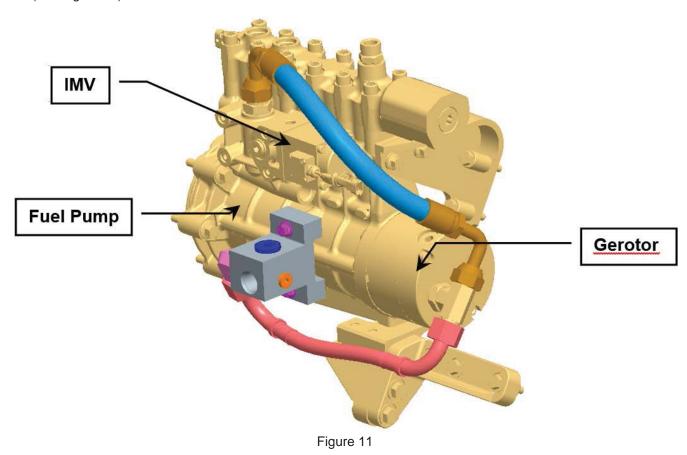


Figure 10

The injector is positioned in the center of the cylinder head and is much longer than the previous mechanically actuated unit injector. The new injector now protrudes through the valve cover for fuel pipe accessibility, and to accommodate the electrical connections (see Figure 10). Removal distance for the injector is 270 mm (10.6 in).

Fuel Pump

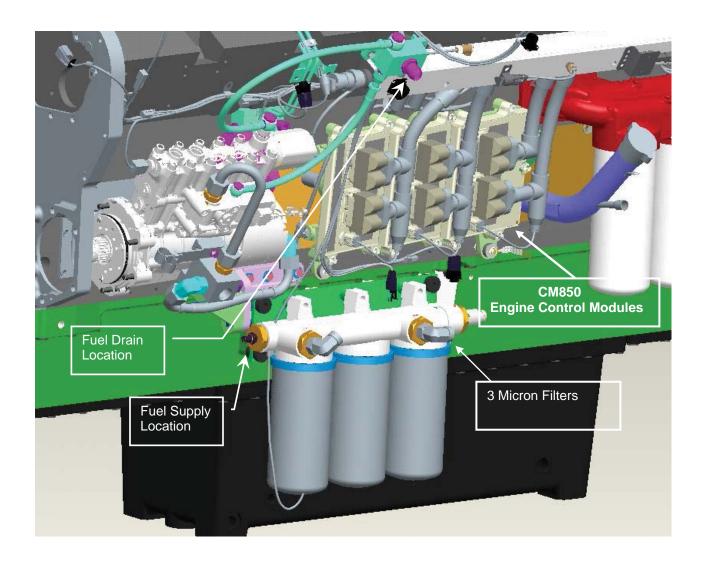
The new fuel system uses a five cylinder pump to deliver fuel to the electronic injectors at very high up to 1600 bar (see Figure 11).



The pressure is controlled by an electronic actuator at the pump inlet called the inlet metering valve (IMV) and is measured by a special pressure sensor that is mounted on the top of the pump. The pump is lubricated by engine oil for long durability and it includes a mechanically driven gerotor pump on the rear that is used to feed fuel into the high pressure pumping section.

Fuel Filter Head and Fuel Filters

The new fuel system configuration includes a new fuel filter head with an integral electronic priming pump and two stages of fuel filters (see Figure 12). Two stage fuel filtering is required to improve the filtering efficiency of the system.



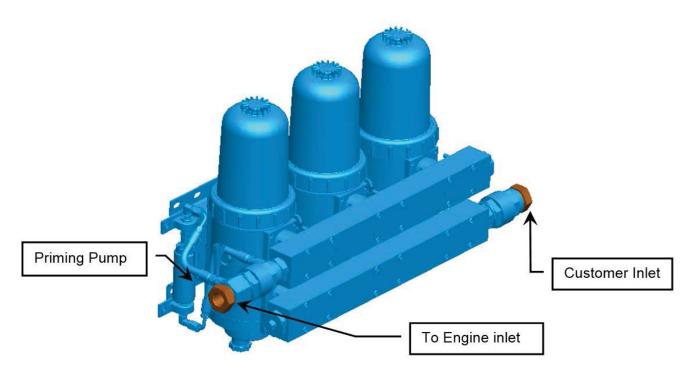


Figure 13

The Stage-1 (or suction side) filter provides 7 micron filtration (Figure 13) and includes water separation capability. The Stage-2 (or pressure side) filter provides 3 micron filtration after the gerotor pump. The QSK50 engine will be equipped with a Fleetguard FF19763 filter for Stage-1 and two Fleetguard FF5607 filter for Stage-2. Service intervals for both filters are 500 hours.

Fuel Coolers

Heat rejection to the fuel is low enough to allow customers to run without a heat exchanger on the fuel drain.

Fuel Supply and Drain Connections

The fuel supply connection is located on the fuel filter head, on the left bank of the engine. The fuel drain connection has been integrated into the fuel pump plumbing, which is also located on the left side of the engine (see Figure 12).

The fuel supply and drain fitting are both the same size as defined below.

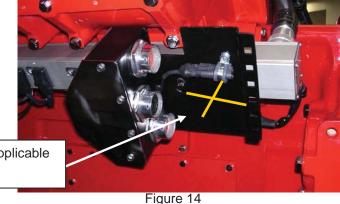
Fuel Supply: 1 1/16-12 UNF, elbow union **Fuel Drain:** 1 1/16-12 UNF, straight union

Electronic Engine Control System

The new QSK50 engine uses a state of the art, integrated electronic control system. The core of the system is the new CM850/CM2150 Electronic Control Module (ECM) to provide advanced engine control and an enhanced electronic feature set. The new electrical system uses all of the base engine sensors. The three CM850/CM2150 modules are mounted on the left bank of the engine near the pan rail (see Figure 12).

The OEM connectors are located at the back, left side of the engine in approximately the same location as the current QSK engine configuration (see Figure 14). Two OEM connections are now required for the new configuration since the power, ground, and key switch inputs have been broken out separately. The OEM connectors required for the new configuration are the following:

- Power Connector
 - Deutsch HD34-24-16PE
 - Sixteen 12 Gauge (AWG) Contacts
- OEM Connector B
 - Deutsch HD34-24-31PE
 - Thirty One 16 Gauge Contacts



23 pin connector is not applicable for G-Drive applications

i iguie 14

Customer Option Discussion

Engine Configuration

The technical configuration number for the QSK50, Tier 2 engine is <u>D283039GX03</u> (single stage turbo charging).

Pricing Specs and Product IDs

For the latest Pricing Specs and Product IDs please refer to the link below.

https://gce.cummins.com/pgce/pg_main/g-drive_global_index.html

Customer Option Changes

For information about customer options please refer to the following link.

https://gce.cummins.com/pgce/pg_main/g-drive_global_index.html

Accessory Drive Pulley

The accessory drive pulley option (AD Option) has changed from a mandatory to a general option. All of the AD options will be released under the new configuration, including the specification for just the timing hub.

Internal Use Only - For business use only by employees and authorized non-Cummins entities with a need to know basis per CORP-00-24-0-00.

Cabin Heater Plumbing

A new mandatory option category for the cabin heater plumbing (HC Option) has been added to the new configuration that helps to define the water manifold plumbing arrangement. The three options available are the following:

HC 6005 – This option includes a 1 1/16 UN plumbing port at the back of the right bank water manifold.

HC 6006 – This option includes a 1 1/16 UN plumbing port at the back of the left bank water manifold.

HC 6007 – This option includes cup plugs to seal both ports.

Installation Recommendations

Installation recommendations and requirements will be based on the stated data sheet values for these engines, as well as current recommendations and requirements discussed in the relevant AEB/CEBs. New installations of the QSK50 Tier 2 engines are subject to a G-Drive Installation Design Review.

Service Publications

Service literature is currently being developed for the new engine configuration and is expected to be complete prior to production launch. (See Table below for a list of reference material being developed.)

QSK50 Service Literature

Literature Description	Part Number	
Electronic Troubleshooting and Repair Manual	4021533 (CM850) 4022102 (CM2150)	
Operation and Maintenance Manual	3810497	
Service Manual	4021528	
Wiring Diagram	4021537 (CM850) 4022111 (CM2150)	
Advance Engine Monitoring (CM2150)	2883461	

Revision History

Revision	Date	Author	Description	Page(s)
03	10Feb16	Liz McLean	Added text "EPA".	1
02	11Jan16	Arine Hillery	Initial creation of CEB from AEB 10.139.	All
01	18Feb13	Ayman Hamid	Updated information about TPEM and NSPS rule.	1
			Updated Fuel Rating and Altitude Capability section by deleting text and table and adding a link to	3
			GCE. Added CM2150 to the Electronic Engine Control	13
			System section. Updated Pricing Specs and Product IDs section by	13
			deleting text and table and adding a link to GCE. Updated Customer Option Changes section by	13
			deleting text and adding a link to GCE. Updated Service Publications section with CM2150	14
			document information.	
			Deleted Appendix A and Appendix B.	
00	June 2006	Eric Fay	New Release	All

Internal Use Only - For business use only by employees and authorized non-Cummins entities with a need to know basis per CORP-00-24-0-00.



102-002 Maintenance Schedule

General Information

All maintenance procedures listed for previous intervals **must** also be performed.

For convenience, listed below are the section numbers that contain specific instructions for performing the maintenance.

The K38, K50, QSK38 and QSK50 engines have the following lubricating oil filtration options:

Marine and Industrial

- Spin-on Oil Filter without Centrifuge and without Centinel™
- Spin-on Oil Filter with Centrifuge and without Centinel™
- Spin-on Oil Filter without Centrifuge and with Centinel™
- Spin-on Oil Filter with Centrifuge and with Centinel™
- Eliminator[™] without Centinel[™]
- Eliminator™ with Centinel™.

Power Generation

- Spin-on Oil Filter without Centrifuge and without Centinel™
- Spin-on Oil Filter with Centrifuge and without Centinel™
- Spin-on Oil Filter without Centrifuge and with Centinel™
- Spin-on Oil Filter with Centrifuge and with Centinel™
- Eliminator™ without Centinel™
- Eliminator™ with Centinel™.

The following applicable maintenance schedule for the engine application and the specific oil filtration option used.

Marine and Industrial

Spin-on Oil Filter without Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- · Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 Months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- · Lubricating Oil and Filters Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

• Fuel Pump - Calibrate 1,4

- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Air Shutoff Valve Inspect for Reuse

Spin-on Oil Filter with Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- · Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- · Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Lubricating Oil and Filters Change
- · Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Fleetguard® Centrifuge Clean
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate^{1,4}
- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Air Shutoff Valve Inspect for Reuse

Spin-on Oil Filter without Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Centinel[™] Oil Level Check
- Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check

- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- · Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

Lubricating Oil Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate^{1,4}
- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate^{1,4}
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Air Shutoff Valve Inspect for Reuse

Spin-on Oil Filter with Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- · Lubricating Oil Level Check
- Centinel[™] Oil Level Check
- Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- · Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Lubricating Oil Analysis Check
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- Charge-Air Cooler Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

• Lubricating Oil Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Fleetguard® Centrifuge Filter Clean

- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate 1,4
- · Cooling System Flush
- Fan Hub. Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Air Shutoff Valve Inspect for Reuse

Eliminator™ without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Centinel™ Oil Level Check
- Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Eliminator™ Filter Rotation Check
- Fuel Filter. Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

• Fuel Filter (Spin-On Type)¹ - Change

- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 250 Hours or 1 Year (Section 5)

Lubricating Oil and Filters - Change

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge Clean and Check
- Eliminator™ Filter Pressure Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- · Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate 1,4
- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate^{1,4}
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Air Shutoff Valve Inspect for Reuse

Eliminator™ with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Eliminator[™] Filter Rotation Check
- Centinel[™] Oil Level Check
- · Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge Clean
- Eliminator™ Filter Pressure Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Coolant Heater Check

- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate 1,4
- · Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Air Shutoff Valve Inspect for Reuse

The below list is in reference to the upper indexes used in above Marine and Industrial scheduled maintenance.

- 1. Mechanically actuated injector engines only.
- 2. Electronically actuated injector engines **only**. Alternate fuel filter drain informationis available in the oil drain and fuel filter section of this procedure.
- 3. After an initial adjustment at 1500 hours, it is recommended that the valves and injectors **not** be adjusted again prior to injector calibration at the 6000 hours or 2 years interval.
- 4. Calibration **must** be performed by the nearest Cummins® Authorized Repair Location.
- 5. Recommended at engine half life to rebuild. Half life varies by application. Contact the nearest Cummins® Authorized Repair Location if the interval can **not** be determined.
- 6. CENSE™ CM530 modules only: Reset is not necessary on CM2330 modules.

Power Generation

Spin-on Oil Filter without Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- · Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 Months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 250 Hours or 1 Year (Section 5)

Lubricating Oil and Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust 1,3
- Engine Oil Heater Check
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate^{1,4}
- Cooling System Flush

- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Crankcase Breather Element Change
- Air Shutoff Valve Inspect for Reuse

Spin-on Oil Filter with Centrifuge and without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- · Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

Lubricating Oil and Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Fleetguard® Centrifuge Clean
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate 1,4
- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Crankcase Breather Element Change
- Air Shutoff Valve Inspect for Reuse

Spin-on Oil Filter without Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Centinel[™] Oil Level Check
- · Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check

- · Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter. Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 Months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

Lubrication Oil and Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust 1,3
- Engine Oil Heater Check
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate^{1,4}
- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

• Injector - Calibrate 1,4

Turbocharger - Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Crankcase Breather Element Change
- Air Shutoff Valve Inspect for Reuse

Spin-on Oil Filter with Centrifuge and with Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Centinel™ Oil Level Check
- · Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- · Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Lubricating Oil Analysis Check
- · Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- Charge-Air Cooler Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

• Lubricating Oil Filters - Change

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Fleetguard® Centrifuge Filter Clean
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- · Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate^{1,4}
- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Crankcase Breather Element Change
- Air Shutoff Valve Inspect for Reuse

Eliminator™ without Centinel™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Eliminator™ Filter Rotation Check
- Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain

• Fuel Filter, Remote Mounted² - Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 250 Hours or 1 Year (Section 5)

Lubricating Oil and Filters - Change

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge Clean
- Eliminator™ Filter Pressure Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- · Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate 1,4
- Cooling System Flush
- Fan Hub, Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate^{1,4}
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- · Vibration Damper, Viscous Check
- Crankcase Breather Element Change
- Air Shutoff Valve Inspect for Reuse

Eliminator™ with CentineI™

Maintenance Procedures at Daily Interval (Section 3)

- Crankcase Breather Tube Check
- Fuel-Water Separator Drain
- Lubricating Oil Level Check
- Centinel[™] Oil Level Check
- Coolant Level Check
- Sea Water Strainer Clean
- Air Cleaner Precleaner Clean
- Air Intake Piping Check
- Air Cleaner Restriction Check
- Air Tanks and Reservoirs Drain
- Marine Gear Check
- Drive Belts Check
- Fuel Filter, Remote Mounted² Drain
- Eliminator™ Filter Rotation Check
- Fuel Filter, Remote Mounted² Check

Maintenance Procedures at 250 Hours or 6 months (Section 4)

- Fuel Filter (Spin-On Type)¹ Change
- Fuel Filter (Stage 1)² Change
- Fuel Filter (Stage 2)² Change
- Coolant Filter Change
- Fan, Cooling Check
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration Check
- Zinc Anode Check
- CENSE™ Datalogger Reset⁶
- Engine Support Bracket, Front Check
- Engine Mounts Check
- Water Pump Weep Hole Filter Check

Maintenance Procedures at 1000 Hours or 1 Year (Section 6)

- Eliminator™ Filter Centrifuge Clean
- Eliminator™ Filter Pressure Check

Maintenance Procedures at 1500 Hours or 1 Year (Section 7)

- Engine Steam Cleaning Clean
- Overhead Set Outer Base Circle (OBC) Adjust^{1,3}
- Overhead Set (Travel Method) Adjust^{1,3}
- Engine Oil Heater Check
- Coolant Heater Check
- Fan Drive Idler Arm Assembly Check
- Radiator Hoses Check
- Cooling Fan Belt Tensioner Check
- Air Compressor Discharge Lines Check
- Batteries Check
- Battery Cables and Connections Check

Maintenance Procedures at 6000 Hours or 2 Years (Section 8)

- Fuel Pump Calibrate 1,4
- Cooling System Flush
- Fan Hub. Belt Driven Check
- Sea Water Pump Check
- Water Pump Check
- Air Compressor Unloader and Valve Assembly Check

Maintenance Procedures at 6000 Hours (Section 9)

- Injector Calibrate 1,4
- Turbocharger Inspect for Reuse

Maintenance Procedures at 10,000 Hours (Section 10)

- Injectors Replace^{2,5}
- Vibration Damper, Viscous Check
- Crankcase Breather Element Change
- Air Shutoff Valve Inspect for Reuse

The below list is in reference to the upper indexes used in above Power Generation scheduled maintenance.

- 1. Mechanically actuated injector engines **only**.
- 2. Electronically actuated injector engines **only**. Alternate fuel filter drain information is available in the oil drain and fuel filter section of this procedure.
- 3. After an initial adjustment at 1500 hours, it is recommended that the valves and injectors **not** be adjusted again prior to injector calibration at the 6000 hours or 2 years interval.
- 4. Calibration must be performed by the nearest Cummins® Authorized Repair Location.
- 5. Recommended at engine half life to rebuild. Half life varies by application. Contact the nearest Cummins® Authorized Repair Location if the interval can **not** be determined.
- 6. CENSE™ CM530 modules only: Reset is not necessary on CM2330 modules.

Oil Drain and Fuel Filter Change Intervals



The use of a synthetic base oil does not justify extended oil change intervals. Extended oil change intervals can decrease engine life due to factors such as corrosion, deposits, and wear.

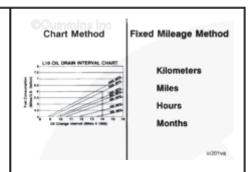


Do not extend oil change intervals beyond the maximum point shown when fuel consumption rates are less than the minimum shown. Doing so can result in shortened engine life due to oil degradation processes associated with lightly loaded engines.

Do **not** extend oil and filter change intervals beyond those specified configurations in the maintenance schedule, unless the chart method is used. See the oil interval charts in this section.

The chart method provides no benefit to a customer that is operating with a Centinel™ system. Therefore, the fixed hour method can always be used when Centinel™ is utilized.







CAUTION A





Do **not** extend oil change intervals beyond the maximum point shown when fuel consumption rates are less than the minimum shown. Doing so can result in shortened engine life due to oil degradation processes associated with lightly loaded engines.

Oil change intervals can be determined by one of the following recommended methods:

Fixed-Hour Method (based on fixed hours or months, whichever occurs first)

• Chart Method (based on known fuel consumption rates, coupled with oil analysis program)

The chart method is recommended to provide the lowest total cost of operation, while still protecting the engine.

The information listed below is required when using the chart method to determine the correct oil and filter change interval for the engine.

- Oil system capacity (sump plus any remote tank volume)
- Average fuel consumption rate
- Classification of oil as standard or premium
- Oil analysis to demonstrate the chart method interval is acceptable.

Sump capacity can be determined by knowing the volume of the oil required to touch the high-level mark on the dipstick. Oil sump capacities are listed in the operation and maintenance manuals for all Cummins® engines. It is imperative that the total system volume be known when using the chart method. Use the following procedure for oil sump capacity information. Refer to Procedure 018-017 in Section V.

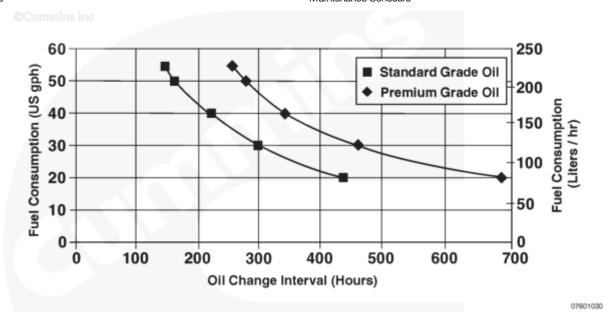
To use the chart method effectively, accurate fuel consumption records **must** be kept and maintained. Fuel consumption information **must** be in liters per hour or gallons per hour units to use the charts. Fuel consumption rates can change over time because of an increasing or decreasing engine duty cycle. Accurate records are essential in determining average fuel consumption during a given oil change interval.

The charts are categorized and labeled by the system capacity for a specific engine family. Select the chart representing the correct oil system capacity for the engine model in question. The left vertical axis of the chart represents fuel consumption in gallons per hour. Determine the intersection point of the fuel consumption rate on the applicable interval curve by drawing a horizontal line. From this point, draw a vertical line down until it intersects with the horizontal axis representing hours. This point represents the acceptable oil change interval.

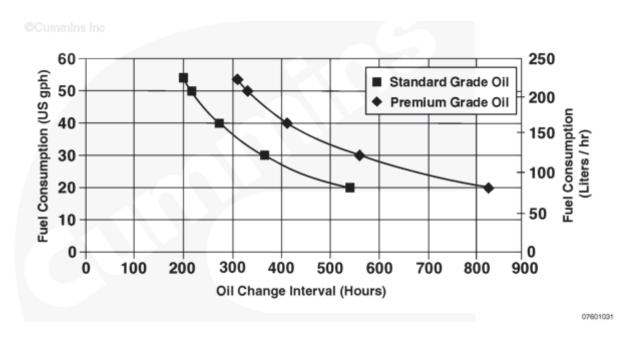
Lubricating Oil Filters

Premium filters are recommended, in conjunction with premium grade oils, when using the premium grade oil curves to determine oil change intervals. Premium filters contain synthetic media materials to provide more efficient filtration for the entire service life and to extend the media life over conventional cellulose media. Premium full-flow filters are made with synthetic media and have the StrataPore™ designation on the outside of the filter. StrataPore™ filters have the efficiency, capacity, and strength needed for this extended service.

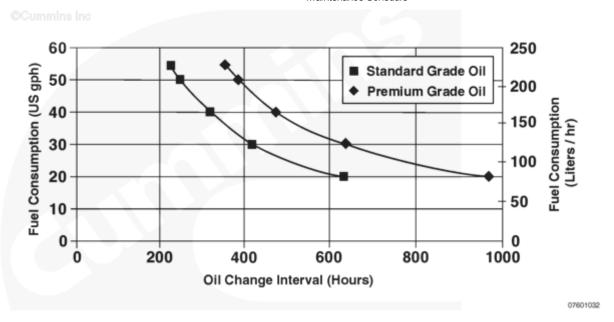
All Applications



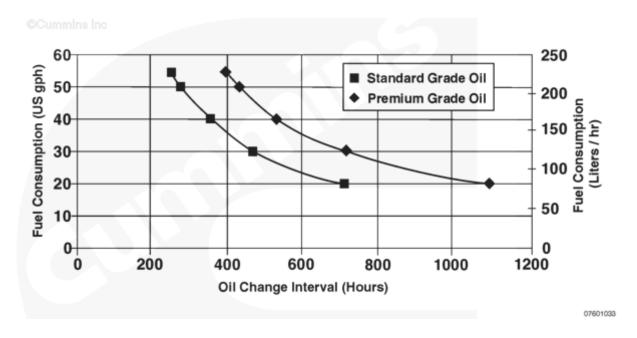
K38 Oil Change Interval - 113 liter [30 gal] Sump (with spin-on or Eliminator™ filters)



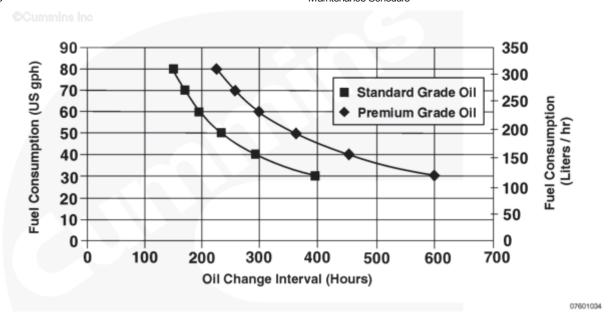
K38 Oil Change Interval - 140 liter [37 gal] Sump (with spin-on or Eliminator™ filters)



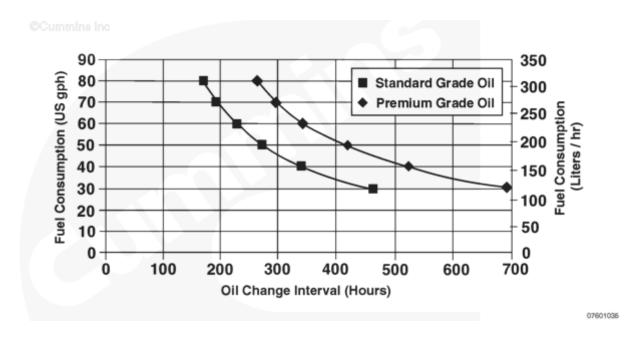
K38 Oil Change Interval - 166 liter [44 gal] Sump (with spin-on or Eliminator™ filters)



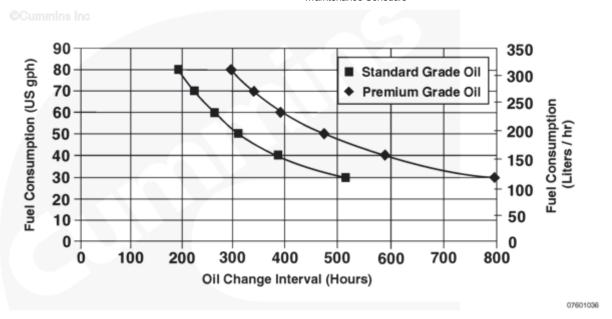
K38 Oil Change Interval - 185 liter [49 gal] Sump (with spin-on or Eliminator™ filters)



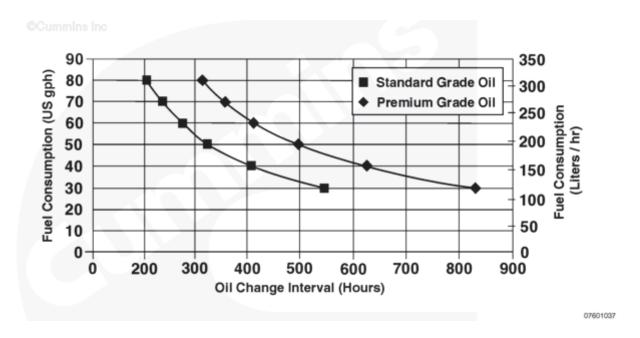
K50 and QSK50 Oil Change Interval - 151 liter [40 gal] Sump (with spin-on or Eliminator™ filters)



K50 and QSK50 Oil Change Interval - 178 liter [47 gal] Sump (with spin-on or Eliminator™ filters)



K50 and QSK50 Oil Change Interval - 204 liter [54 gal] Sump (with spin-on or Eliminator™ filters)



K50 and QSK50 Oil Change Interval - 216 liter [57 gal] Sump (with spin-on or Eliminator™ filters)

Fuel Filter Change Intervals for Electronicaly Actuated Injector Engines Only

- Fuel filter change intervals are set at 250 hours in order to protect the fuel system from hard particles.
- **Not** all fuel filters available on the market are equivalent, and may **not** protect the fuel system adequately beyond the 250 hour threshold.
- Cummins Inc. requires the following hardware to achieve Stage 1 and Stage 2 fuel filter change intervals beyond 250 hours, and up to but **not** exceeding 500 hours:

- FU239 series Industrial Pro filter head must be installed as the Stage 1 fuel filter head
- Fleetguard® NanoNet™ media tier filters must be used on Stage 1 and Stage 2 fuel filters
- Use the following procedure for fuel filter part numbers. Refer to Procedure 018-024 in Section V.

Cummins Inc. does **not** recommend fuel filter change intervals exceed 500 hours.

The most common cause of degraded engine performance is poor fuel quality. Fleetguard® NanoNet™ media filters are designed to function with greater filtration efficiency than other filters, and thus retain more contaminants. If premature filter plugging is observed, additional filtration or improved fuel quality may be necessary to reach desired maintenance intervals. For more information on fuel cleanliness recommendations, reference the "Fuel Cleanliness" section of the Fuels For Cummins® Engines, Bulletin 3379001.

Coolant Drain Interval

Maintenance Intervals for Cooling System up to 568 liters [150 gal]					
	System Size in liters [gal]				
	79-144 [21- 30]	117-189 [31- 50]	193-284 [51- 75]	288-378 [76- 100]	382-568 [101- 150]
Hours	Units of SCA				
751- 1000	25	50	80	75	150
501-750	20	35	60	100	110
251-500	15	25	40	50	75
0-250	10	15	20	25	40

Maintenance Intervals for Cooling System up to 1514 liters [400 gal]					
	System Size in liters [gal]				
	572-757 [151- 200]	761-946 [201- 250]	950-1135 [251- 300]	1139-1325 [301- 350]	1329-1514 [351- 400]
Hours	Units of SCA				
751- 1000	200	250	300	350	400
751- 1000	150	190	225	260	300
251- 500	100	125	150	175	200

0-250 50Maintenance 65tervals for Co75ing System u 90 1514 liters [4009al]

Notes:

- A. Consult the vehicle equipment manufacturer's maintenance information for total cooling system capacity.
- B. When draining and replacing the coolant, **always** pre-charge the cooling system to a SCA level of 1.5 units per gallon. This concentration level **must not** be allowed to go below 1.2 units and **must** be controlled when the level is greater than 3 units. Action needed when the level goes below 1.2 is a filter and liquid pre-charge; from 1.2 to 3.0 units, filter **only**; above 3.0, test at every oil change until the level falls to 3.0 or below.
- C. For coolant filter part numbers and SCA capacity. Refer to Procedure 018-024 in Section V
- D. Change coolant filters at each oil change to protect the cooling system. Consult the coolant capacity chart to determine the correct coolant filter for a given cooling system capacity and oil drain interval.

Last Modified: 09-Dec-2015

Copyright © 2000-2010 Cummins Inc. All rights reserved.

Engine No. SAMPLE	Advert. Power HP/kW 967 /721 AT 1800	RPM ECS. DDI ECM TC CAC	EMISSION CONTROL INFORMATION: In the U.S. this engine may be used only in Stationary Emergency applications in accordance with
EPA Family HCEXL050.AAD	Advert. Power HP/kW / AT	RPM Disp. L 19.0	requirements of 40 CFR part 60 and is excluded from the requirements of 40 CFR parts 89 and 1039. Installing or using this engine in any
FR FR0458200	NO _X FEL PM FEL	Inj. Timing KU	other application may be a violation of U.S. Federal law subject to civil penalty. This engine is certified to operate on dieset
Date of Mfg.	Power Category	CPL 3866	fuel. WARNING: Injury may result and warranty is voided if fuel rate,
Model QSK19-G8	Valve Lash Cold IN/mm 0.014/0.356	Int. 0.027/0.686 Exh.	RPM, or altitudes exceed published maximum values for this model and application.
Ref. No. A041U120A		Cummins Inc. Assembled in U.S.A.	4333872 Warranty Start Date